SOIL SURVEY of the Saline Valley Area

by James C. Wardlaw - 1979

Inyo County, California

U.S. Department of the Interior
Bureau of Land Management

Soil Survey

of the

Saline Valley Area

Inyo County, California

by James C. Wardlaw,

U. S. Bureau of Land Management
Bakersfield District

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This is a publication of the U.S. Department of the Interior, Bureau of Land Management. It is an interim report and in all likelyhood it will be incorporated in an official National Cooperative Soil Survey Publication published by the U.S. Department of Agriculture, Soil Conservation Service at some later date. Review of this document was a joint effort of the Bureau of Land Management, Soil Conservation Service, and University of California, Cooperative Extension.

Major fieldwork for this soil survey was completed in the period May through September, 1976. Unless otherwise indicated, statemants in the publication refer to conditions in the Survey area in 1976. The final correlation conference was held in Portland Oregon at the West Technical Service Center, Soil Conservation Service (WTSC) the week of September 17 to 21, 1979. Participants were: J. Ellsworth Brown, Soil Scientist, SCS, WTSC; Terry D. Cook, State Correlator, SCS California; Martin A. Townsend, State Soil Scientist, BLM California; James C. Wardlaw, Soil Survey Party Leader, California State Office BLM. The final correletion documant of the Saline Valley Area, Inyo County California was prepared by J. Ellsworth Brown, SCS, WTSC. The soil names and descriptions were approved by the WTSC in March 1980.

Soil maps in this publication may be copied without permission, but any enlargements of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

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SUMMARY OF TABLES

Forword

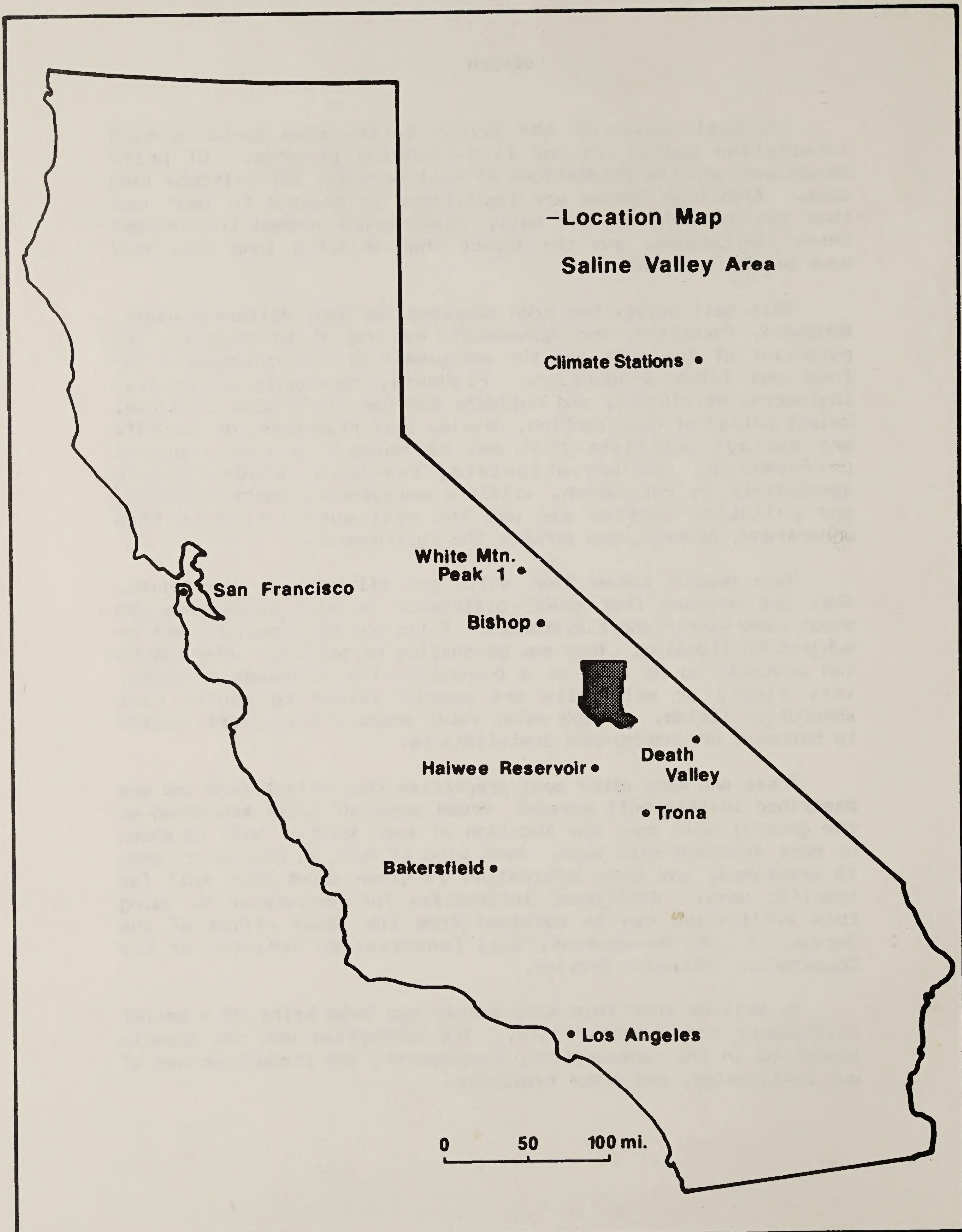
The Soil Survey of the Saline Valley area contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users. Ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, and builders can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Many people assume that soils are all more or less alike. They are unaware that great difference in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basement or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on more detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information for assistance in using this publication can be obtained from the local office of the Bureau of Land Management, Soil Conservation Service, or the Cooperative Extension Service.

We believe that this soil survey can help bring us a better environment and a better life. Its widespread use can greatly assist us in the conservation, development, and productive use of our soil, water, and other resources.


-Location Map
Saline Valley Area
Climate Stations •
White Mtn. Peak 1
San Francisco
Bishop
Haiwee Reservoir
Death Valley
Trona
Bakersfield
Los Angeles
0
50
100 mi.

Introduction

General Nature of the Area

The Saline Valley area is situated in Inyo County, California about 180 miles north of Los Angeles and 200 miles southeast of San Francisco. It contains roughly 700 square miles or 418,000 acres. The valley itself is bounded on the west by the Inyo Mountains with elevations to 11,000 feet. To the south lies the Nelson Range, to the east the Panamint Range, and on the north it is bounded by the Saline Range. Death Valley Monument lies just east of Saline Valley. Differences in elevation are marked from a low of about 1,050 feet to a high of about 11,000 feet within a distance of 10 miles.

The central portion of the survey area consists of the undrained basin, Saline Valley. There are numerous, broad bahadas along the valley margins and a large salt lake in the low center. At each end of the salt lake are sand dunes of a type frequently associated with desert salt flats. The northern end of the area consists of the plateau-form Saline Range, the major portion of which is made up of monoclinic basalt flows, bounded on the west by extremely steep escarpments. To the west of the Valley, the Inyo Mountains rise sharply; forming a nearly perpendicular escarpment in many places. The Nelson Range rises abruptly to the south, but the differences in relief are not as sharp as in the Inyo Mountains. The northern part of the dry, rugged Panamint Range makes up the eastern portion of the area. It consists of numerous, very steep, and rocky mountain ridges and barren drainage basins.

Climate

Table V gives data on temperature and precipitation for climate stations in Inyo County, as recorded for the period 1951 to 1960. Table W shows probable dates of the first freeze in fall and the last freeze in spring. Table X provides data on length of the growing season.

In winter the average temperature ranges between 20 degrees F. in the Inyo Mountains to 45 degrees F. in the Valley. In summer the average daily temperature is about 90 degress, in the Valley and 60 degrees in the Inyos; the average daily maximum is about 105 degrees.

Of the total annual precipitation, one inch, or less than 25 percent, usually falls in April through September, which includes the growing season for most plants. In two years out of 10, the April-September rainfall is less than .5 inches. Thunderstorms occur on about 3 to 5 days each year, and occur in late July or August.

Average seasonal snowfall for the Inyo Mountains is about 50 inches. On the average, about 100 days have at least one inch of snow on the ground, but the number of days varies greatly from year to year.

In the Valley snowfall is rare. In greater than 50 percent of the winters, there is no measureable snowfall, and in 80 percent the snowfall is less than one inch.

In the Valley the average relative humidity in midafternoon in spring is less than 20 percent; during the rest of the year it is about 25 percent. Humidity is higher at night in all seasons, and the average at dawn is about 40 percent. The percentage of possible sunshine is about 95 in summer and about 70 in winter. The prevailing direction of the wind is from the WSW. Average windspeed is estimated to be 15 mph. The highest is estimated to be about 80 miles per hour, in most years.

Climate Station Index and History

	County	Lat.N	Long.W.	Elevation	Temperature Year	Temperature Month	Precipitation Year	Precipitation Month
Bishop Airport	Inyo	37°32'	117°22'	4108	C		C	
Death Valley	Inyo	36°28'	116°52'	194	C		C	
Haiwee Reservoir	Inyo	36°08'	117°57'	3825	C		C	
Trona	San Bernardino	35°47'	117°23'	1695	C		C	
White Mountain Peak	Mono	37°30'	118°11'	10150	1955	Oct.	1955	Oct.

C - Station established prior to 1951

Table V

MEAN TEMPERATURE

Station: Bishop Airport - elevation 4108'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1951	39.1	41.9	48.1	56.3	63.9	72.0	78.6	74.4	70.9	56.5	44.6	34.7	56.8
1952	30.4	41.3	40.6	54.8	64.2	67.1	76.7	75.0	67.9	60.9	41.9	36.8	54.8
1953	43.5	42.2	47.5	54.1	55.5	68.0	79.6	72.6	70.0	55.1	46.5	39.6	56.2
1954	38.0	46.4	43.8	58.6	66.9	70.0	77.4	71.2	65.8	56.5	46.4	37.3	56.7
1955	27.2	37.8	45.5	49.9	58.2	69.2	74.8	75.8	67.1	58.4	45.3	39.1	54.0
1956	39.2	37.6	48.1	52.9	61.3	71.3	75.2	71.8	68.9	54.8	47.3	41.5	55.8
1957	32.1	45.5	49.4	53.8	59.8	73.2	74.9	73.1	67.8	53.9	44.0	40.9	55.7
1958	39.9	44.4	42.0	52.2	64.7	69.0	75.8	77.4	68.3	59.9	47.2	44.1	57.1
1959	41.0	38.5	50.5	58.0	60.3	73.6	80.0	73.8	65.9	59.7	48.8	40.6	57.6
1960	33.2	40.4	51.6	56.8	63.0	75.9	78.4	76.1	70.5	56.9	43.9	39.7	57.2
Period	36.4	41.6	46.7	54.7	61.8	70.9	77.1	74.1	68.3	57.3	45.8	39.4	56.2
Years	10	10	10	10	10	10	10	10	10	10	10	10	10
Record	36.8	41.5	46.3	54.0	60.4	68.3	74.8	72.2	66.1	56.0	45.2	39.4	55.0
Years	40	40	40	40	40	40	40	40	40	40	40	40	40
Normal	36.8	41.2	47.6	55.1	62.6	69.8	76.6	74.3	68.2	57.4	45.8	39.3	56.2

Table V

MEAN TEMPERATURE

Station: Death Valley - elevation 194'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1971	52.8	60.6	66.9	75.1	81.9	94.4	103.8	104.6	91.2	74.0	61.1	51.6	76.5
1972	49.9	59.2	75.0	76.5	86.6	95.4	103.7	98.6	88.7	74.7	59.8	49.3	76.5
Normal	52.0	58.2	67.3	77.0	85.1	93.9	101.6	99.1	90.9	77.0	61.5	53.1	76.4

Table V

MEAN TEMPERATURE

Station: Haiwee Reservoir - elevation 3825'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1951	41.4	43.7	49.8	75.8	65.7	74.3	82.4	78.6	75.2	60.9	48.0	39.4	59.8
1952	35.0	43.5	41.9	56.7	66.1	67.2	78.7	78.9	72.2	65.7	45.5	39.2	57.6
1953	45.8	44.0	49.3	56.6	56.7	70.1	81.9	77.4	73.3	58.6	49.8	42.5	58.9
1954	41.4	48.9	45.9	61.3	68.6	72.0	81.0	75.4	71.5	61.7	51.7	39.3	59.9
1955	33.7	39.6	47.8	52.7	61.3	71.8	77.6	79.6	73.7	63.4	49.4	44.0	57.9
1956	44.1	41.1	50.6	54.4	63.4	74.4	77.6	75.4	74.8	58.5	47.6	43.2	58.8
1957	34.4	47.2	50.9	55.7	60.4	76.8	79.8	77.8	71.8	56.8	45.5	42.3	58.3
1958	42.6	47.0	44.2	55.0	67.3	73.1	78.8	81.0	73.8	65.3	49.8	46.1	60.3
1959	44.1	41.7	53.9	62.3	63.8	77.4	84.2	77.2	69.9	63.9	51.0	43.4	61.1
1960	36.6	42.7	54.6	59.6	65.2	79.1	82.1	79.7	74.9	60.6	47.6	41.6	60.4
Period	39.9	43.9	48.9	57.2	63.9	73.6	80.4	78.1	73.1	61.6	48.6	42.1	59.3
Years	10	10	10	10	10	10	10	10	10	10	10	10	10
Record	40.1	44.6	50.3	58.2	65.7	74.0	81.2	79					

Table V

MEAN TEMPERATURE

Station: Trona - elevation 1695'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1951	47.0	51.5	57.3	65.3	74.3	82.6	90.8	86.7	82.5	67.5	54.0	45.1	67.1
1952	42.1	50.9	52.6	63.8	76.3	76.	87.9	88.3	79.6	71.7	51.4	43.7	65.4
1953	47.9	47.6	57.1	64.5	66.5	78.2	92.1	85.7	81.9	66.5	-	-	-
1954	47.2	56.5	54.1	70.6	77.7	80.5	90.8	83.6	80.1	68.9	57.1	43.9	67.6
1955	42.4	47.4	57.8	60.6	70.8	81.0	86.7	90.6	80.6	70.0	53.9	49.1	65.9
1956	49.9	48.6	58.2	64.4	74.6	84.4	88.2	85.7	84.1	66.8	50.9	45.3	66.8
1957	43.1	55.6	60.3	64.7	69.3	85.6	88.2	86.5	79.7	64.7	52.1	45.4	66.3
1958	47.7	54.6	52.4	63.1	76.3	80.7	87.5	91.3	80.5	72.6	54.4	47.3	67.4
1959	50.4	49.2	60.5	69.5	71.2	85.3	93.8	87.0	78.2	70.7	54.8	47.0	68.1
1960	42.2	49.0	60.7	66.4	73.1	87.1	90.9	87.5	82.6	67.5	53.2	45.1	67.1
Period	46.0	51.1	57.1	64.3	73.0	82.2	89.7	87.3	81.0	68.7	53.5	45.8	66.7
Years	10	10	10	10	10	10	10	10	10	10	10	9	9
Record	44.6	50.5	57.1	65.1	73.3	81.5	89.0	86.8	79.4	62.2	53.5	45.6	66.1
Years	40	40	40	40	40	40	40	40	40	40	40	39	39
Normal	45.1	50.6	57.4	65.8	73.6	81.6	89.4	87.2	80.3	68.0	53.9	46.1	66.6

Table V

MEAN TEMPERATURE

Station: White Mountain (1) - elevation 10150'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1971	22.9	21.0	24.6	27.7	31.5	43.5	51.5	51.7	42.8	30.3	24.8	12.8	32.1
1972	18.7	21.0	29.4	28.5	37.2	46.6	54.2	50.4	41.2	30.9	21.2	18.3	33.1
Normal													

Table V

MEAN NUMBER OF DAYS WITH TEMPERATURE
$\geq$ 90' or $\leq$ 32°

Station	Temp/ Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
Bishop	more than	0	0	0	0	5	20	30	28	18	1	0	0	102
	90/years	10	10	10	10	10	10	10	10	10	10	10	10	
	less than	30	25	22	7	1	0	0	0	0	7	25	30	147
	32/years	10	10	10	10	10	10	10	10	10	10	10	10	
Haiwee	more than	0	0	0	0	1	13	26	23	14	0	0	0	77
	90/years	10	10	10	10	10	10	10	10	10	10	10	10	
	less than	21	15	15	1	0	0	0	0	0	0	8	19	73
	32/years	10	10	10	10	10	10	10	10	10	10	10	10	
Trona	more than	0	0	0	5	17	27	31	30	27	11	0	0	148
	90/years	10	10	10	10	10	10	10	10	10	10	10	10	
	less than	14	6	3	0	0	0	0	0	0	0	6	8	47
	32/year	10	10	10	10	10	10	10	10	10	10	10	10	

Table V

MEAN DAILY MAXIMUM
TEMPERATURE

Station	No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
Bishop	Per. 10	52.2	58.2	64.5	72.8	80.3	91.5	97.9	95.7	89.8	77.7	64.6	56.6	75.2
	Rec. 40	52.7	57.2	63.4	72.2	78.5	8718	94.8	92.6	86.7	75.9	64.0	55.3	73.4
Haiwee	Per. 10	50.3	55.7	61.7	69.9	77.2	87.6	94.4	92.3	87.4	75.4	60.8	52.9	72.1
	Rec. 36	50.5	55.6	62.4	70.5	78.5	87.6	94.5	92.7	86.1	74.5	61.6	52.1	72.2
Trona	Per. 9	58.6	64.7	72.2	80.7	88.7	99.2	106.3	104.2	99.0	85.8	68.8	59.3	82.3
	Rec. 40	58.2	64.2	72.3	80.9	89.6	98.9	106.3	104.1	97.4	84.2	69.4	59.1	82.1

Table V

MEAN DAILY MINIMUM
TEMPERATURE

Station	No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
Bishop	Per. 10	20.5	25.0	28.9	36.7	43.2	50.3	56.3	52.4	46.8	36.7	27.0	22.2	37.2
	Rec. 40	20.9	25.7	29.1	36.2	42.2	48.7	54.8	51.7	45.5	36.0	26.3	21.2	36.5
Haiwee	Per. 10	29.5	32.2	36.1	44.5	50.5	59.6	66.4	63.8	58.7	47.9	36.4	31.2	46.4
	Rec. 36	29.7	33.5	38.1	45.9	52.8	60.4	67.6	65.2	58.8	48.3	37.6	31..5	47.5
Trona	Per. 9	33.3	37.5	42.0	49.9	57.3	65.2	73.0	70.4	62.9	51.6	38.4	31.8	51.1
	Rec. 40	30.9	36.6	41.9	49.3	57.0	64.1	71.7	69.5	61.4	50.2	37.7	32.1	50.2

Table V

HIGHEST TEMPERATURE

Station	No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
Bishop	Per. 10	75	78	82	90	101	109	107	105	103	93	84	78	109
	Rec. 40	77	79	85	93	101	109	108	109	106	95	89	81	109
Haiwee	Per. 10	70	74	78	88	99	104	106	102	101	91	79	75	106
	Rec. 36	74	76	82	91	100	106	107	106	104	92	80	75	107
Trona	Per. 9	76	83	93	102	111	118	117	113	112	104	85	78	118
	Rec. 40	78	84	93	102	111	118	118	118	116	106	96	81	118

Table V

LOWEST TEMPERATURE

Station	No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
Bishop	Per. 10	-6	11	10	15	28	32	40	37	32	20	5	9	-6
	Rec. 40	-15	-3	10	15	25	28	36	34	26	18	5	-9	-15
Haiwee	Per. 10	11	20	18	26	36	40	53	50	42	30	20	18	11
	Rec. 36	4	13	18	26	34	40	52	50	32	30	14	12	4
Trona	Per. 9	17	22	25	31	33	44	54	52	45	35	23	15	15
	Rec. 40	10	17	23	31	33	44	54	52	40	28	18	10	10

Table W

Temperature Extremes and Freeze Data

Station	Year	High	Date	Low	Date	Last Spring Minimum				First Fall Minimum				Number of Days Between	
						28° or below		32° or below		28° or below		32° or below		28° or below	32° or below
						Date	Temp	Date	Temp	Date	Temp	Date	Temp		
Bishop 4,108'	1971	106	7/27	8	12/11	4/22	24	5/18	31	10/17	26	9/26	29	178	131
	1972	109	7/16	6	12/141	4/19	22	4/21	30	10/30	25	10/17	32	194	179
Death Valley 194'	1971	124	8/10	29	1/11	none	-	1/11	90	none	-	12/9	30	365	332
	1972	128	7/15	23	12/12	1/6	28	2/3	31	12/10	26	12/6	30	339	307
Haiwee 3,825'	1971	103	3/13	11	1/5	3/14	27	4/18	31	10/29	28	10/17	29	229	182
	1972	110	7/16	12	12/10	3/28	26	3/30	31	11/21	28	10/30	32	238	214
Trona 1,695'	1971	114	8/10	17	1/5	2/3	25	4/15	30	10/30	26	10/29	30	269	228
	1972	118	7/14	11	12/11	2/12	24	3/28	30	11/24	28	11/24	28	286	241
White Mountains 10,150'	1971	73	7/30	-19	12/29	6/30	27	6/30	27	9/3	24	7/1	29	65	1
	1972	77	7/16	-23	12/14	6/25	26	6/27	32	7/21	25	7/21	25	26	24

Table V

TOTAL PRECIPITATION

Station: Bishop Airport - elevation 4108'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1951	.25	.05	T	.33	.08	.33	.07	.01	T	.24	.87	4.20	6.43
1952	5.03	T	2.05	1.02	T	.03	.20	T	.09	.00	.53	1.15	10.10
1953	.11	T	.27	.15	1.17	.03	.19	.03	T	.12	.30	.13	2.58
1954	1.68	2.21	1.00	T	.18	.02	.16	.00	.14	.00	.85	.95	7.19
1955	1.81	.19	T	.41	.88	.00	.04	.22	.14	T	.09	4.02	7.80
1956	1.45	T	.00	2.26	.34	.00	.05	.00	T	.46	.00	.05	4.61
1957	1.61	.57	.07	.41	.47	T	.01	.00	.05	1.58	.32	1.60	6.69
1958	.58	.77	1.46	1.30	.08	.14	T	.02	.10	.03	.28	.00	4.76
1959	.77	2.53	.02	.01	.18	.01	.05	.01	.28	.00	.00	.12	3.98
1960	.18	.81	.03	.01	.01	T	.19	T	.05	.17	2.59	.08	4.12
Period	1.35	.71	.49	.59	.34	.06	.10	.03	.09	.26	.59	1.23	5.84
Years	10	10	10	10	10	10	10	10	10	10	10	10	
Record	1.64	.97	.81	.33	.26	.09	.09	.11	.20	.33	.50	.87	6.20
Years	42	42	42	42	42	42	42	42	42	42	42	42	42
Normal	.99	.98	.55	.46	.20	.09	.12	.12	.19	.43	.53	1.18	5.84

Table V

TOTAL
PRECIPITATION

Station: Death Valley - elevation 194'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1971	.0	.07	.02	.02	.15	.0	.01	.01	.05	T	T	.63	.96
1972	.0	.0	.0	.09	.0	.53	.0	.05	T	1.09	.49	T	2.25
Normal	.21	.24	.17	.16	.08	.01	.12	.14	.11	.11	.19	.27	1.78

Table V

TOTAL
PRECIPITATION

Station: Haiwee Reservoir - elevation 3825'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1951	.20	.05	.09	.06	.38	.00	T	.00	.00	.04	.15	2.45	3.96
1952	3.62	T	3.53	.97	.00	.04	.45	.03	.04	.00	.92	.73	10.33
1953	.14	.00	.64	.43	.03	.00	T	.00	T	.09	.17	.35	1.85
1954	1.68	.78	.54	.02	T	T	.24	.00	.21	.00	.70	.48	4.65
1955	1.13	.04	T	.26	.74	.00	T	T	.00	.00	.38	.97	3.52
1956	2.31	T	.00	1.42	.07	.00	.55	.00	.00	.51	.00	.00	4.86
1957	1.48	.55	.84	.35	.32	.00	T	.00	.15	.08	.24	1.29	5.30
1958	.73	2.97	.82	1.39	.06	.00	.11	.08	.26	.35	T	T	6.77
1959	.83	1.15	T	T	.02	.01	T	T	.49	.13	.00	.60	3.24
1960	.28	1.53	.07	.06	T	T	.08	.00	.39	.41	3.38	T	6.30
Period	1.25	.71	.65	.55	.16	.01	.14	.01	.15	.16	.59	.69	5.07
Years	10	10	10	10	10	10	10	10	10	10	10	10	
Record	.88	1.00	.65	.46	.16	.13	.10	.17	.19	.40	.52	.97	5.63
Years	37	37	37	37	38	38	38	38	38	38	38	38	
Normal	.99	1.12	.65	.46	.12	.07	.11	.20	.18	.43	.46	1.16	5.95

Table V

TOTAL
PRECIPITATION

Station: Trona - elevation 1695'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1951	.35	.00	T	.02	.33	.00	.00	.00	.00	.04	.00	.76	1.50
1952	2.87	.00	2.50	..15	.00	T	T	.02	.19	.00	.77	.66	7.16
1953	.00	.00	T	.17	.00	T	.04	T	.00	.00	.21	.00	.42
1954	2.05	.59	.88	T	.00	T	T	T	.00	.00	1.33	.49	5.34
1955	.48	.01	.00	.24	.47	.00	T	.00	.00	.00	.15	.05	1.40
1956	1.85	.00	.00	.34	T	.00	T	.00	.00	.23	.00	.00	2.42
1957	1.11	.07	.40	.06	.00	.04	.00	.00	.00	.25	.00	.40	2.33
1958	.75	2.22	1.41	.90	.00	.00	T	.45	.27	.00	.00	.00	6.00
1959	.50	1.51	.00	.00	.00	.00	.00	T	.78	T	.15	.81	3.75
1960	.46	1.50	T	.05	T	.00	T	.00	.04	.02	.36		1.98
Period	1.04	.55	.52	.19	.08	T	T	.05	.13	.05	.30	.32	3.23
Years	10	10	10	10	10	10	10	10	10	10	10	10	10
Record	.72	.80	.49	.23	.15	.07	.03	.13	.17	.17	.31	.66	3.93
Years	41	41	41	41	41	41	41	41	41	41	41	41	41
Normal	.76	.87	.50	.20	.07	.06	.03	.13	.22	.18	.30	.70	4.02

Table V

TOTAL PRECIPITATION

Station: White Mountain (1) - elevation 10150'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1951	-	-	-	-	-	-	-	-	-	.00	.36	6.03	-
1956	2.79	.16	.02	4.15	1.79	T	3.30	.03	.02	.96	T	.07	13.29
1957	2.03	1.25	.86	1.90	2.74	T	.06	.00	1.50	1.54	1.22	1.22	14.32
1958	1.61	2.05	3.05	2.28	.94	T	T	1.09	.30	.38	.84	.07	12.61
1959	.29	3.10	.04	.04	1.07	T	2.05	.75	2.25	.69	.00	.36	10.64
1960	.44	1.69	.14	.43	.09	T	.86	.57	.30	.72	4.29	.34	9.87
Period	1.43	1.65	.82	1.76	1.33	T	1.25	.49	.87	.72	1.12	1.35	12.79
Years	5	5	5	5	5	5	5	5	5	6	6	6	

Table V

MEAN NUMBER OF DAYS WITH PRECIPITATION
$\geq$ .10 or $\geq$ .50 inches

Station	Inches/ Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
Bishop	0.10	2	2	1	1	1	+	+	+	+	1	1	1	10
	Years	7	7	7	7	7	7	7	7	7	7	7	7	
	0.50	1	+	+	1	+	0	0	0	0	+	1	1	4
	years	10	10	10	10	10	10	10	10	10	10	10	10	
Haiwee	0.10	2	2	1	1	+	0	1	0	1	1	1	2	12
	years	7	7	7	7	7	7	7	7	7	7	7	7	
	0.50	1	1	1	+	+	0	0	0	0	0	+	+	3
	years	10	10	10	10	10	10	10	10	10	10	10	10	
Trona	0.10	2	2	1	1	+	0	0	+	+	+	1	1	8
	years	7	7	7	7	7	7	7	7	7	7	7	6	
	0.50	1	+	+	0	0	0	0	0	0	0	+	0	1
	years	10	10	10	10	10	10	10	10	10	10	10	10	
White Mountain	0.10	3	4	2	3	3	0	2	1	2	2	2	2	26
	years	5	5	5	5	5	5	5	5	5	6	6	6	
	0.50	1	1	1	1	1	0	1	1	1	+	1	1	10
	years	5	5	5	5	5	5	5	5	5	6	6	6	

+means more than 0 and less than .5

Table V

TOTAL SNOWFALL

Station: Bishop Airport - elevation 4108'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1951	2.9	T	T	T	.0	.0	.0	.0	.0	.0	T	.0	6.9
1952	14.0	.0	14.5	T	.0	.0	.0	.0	.0	.0	T	1.0	29.5
1953	T	T	.0	.0	.0	.0	.0	.0	.0	.0	T	T	T
1954	T	T	T	.0	.0	.0	.0	.0	.0	.0	.0	T	T
1955	20.0	1.5	.0	T	T	.0	.0	.0	T	.0	.0	1.0	22.5
1956	3.0	.0	.0	8.8	.0	.0	.0	.0	.0	.0	.0	.0	11.8
1957	T	T	.0	T	.0	.0	.0	.0	.0	.2	1.0	.0	1.2
1958	T	T	T	1.0	.0	.0	.0	.0	.0	.0	.0	.0	1.0
1959	1.7	1.2	T	.0	.0	.0	.0	.0	.0	.0	.0	T	2.9
1960	1.0	T	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.0
Period	4.3	.3	1.5	1.0	T	.0	.0	.0	T	T	.1	.6	7.8
Years	10	10	10	10	10	10	10	10	10	10	10	10	
Record	5.2	2.4	.7	.3	T	.0	.0	.0	T	T	.6	3.0	12.2
Years	40	40	40	40	40	40	40	40	40	40	40	40	

Table V

TOTAL SNOWFALL

Station: Haiwee Reservoir - elevation 3825'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1951	T	.3	1.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.8
1952	18.5	.0	29.5	.0	.0	.0	.0	.0	.0	.0	5.0	.0	53.0
1953	.0	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.3
1954	4.0	.0	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	4.5
1955	13.0	T	.0	.0	.0	.0	.0	.0	.0	.0	.0	T	13.0
1956	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
1957	T	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	T	T
1958	.0	.0	T	1.0	.0	.0	.0	.0	.0	.0	.0	T	1.0
1959	.0	T	.09	.0	.0	.0	.0	.0	.0	.0	.0	.0	T
1960	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.0
Period	3.7	T	3.2	.1	.0	.0	.0	.0	.0	.0	.5	T	7.5
Years	10	10	10	10	10	10	10	10	10	10	10	10	
Record	2.4	2.0	1.2	.0	.0	.0	.0	.0	.0	.0	1.6	1.4	8.6
Years	29	29	29	29	29	29	29	29	29	29	29	29	

Table V

TOTAL SNOWFALL

Station: White Mountain - elevation 10150'

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann
1955	-	-	-	-	-	-	-	-	-	.0	4.0	69.8	-
1956	30.5	3.0	.5	54.0	6.0	T	.0	.0	.0	4.3	T	.5	98.8
1957	13.0	9.8	9.5	19.0	21.3	T	.0	.0	T	13.5	15.0	13.5	114.6
1958	15.0	22.0	33.5	27.56	11.5	T	.0	T	T	4.0	11.0	1.0	125.5
1959	2.5	36.5	.5	.5	12.5	.0	.0	T	7.0	10.0	.0	6.5	76.0
1960	5.5	19.0	1.5	4.5	1.0	.0	T	.0	T	8.0	36.5	4.0	80.0
Period	13.3	18.1	9.1	21.1	10.5	T	T	T	1.4	6.6	11.1	15.9	107.1
Years	5	5	5	5	5	5	5	5	5	6	6	6	

Table X

Estimated Growing Season and Length

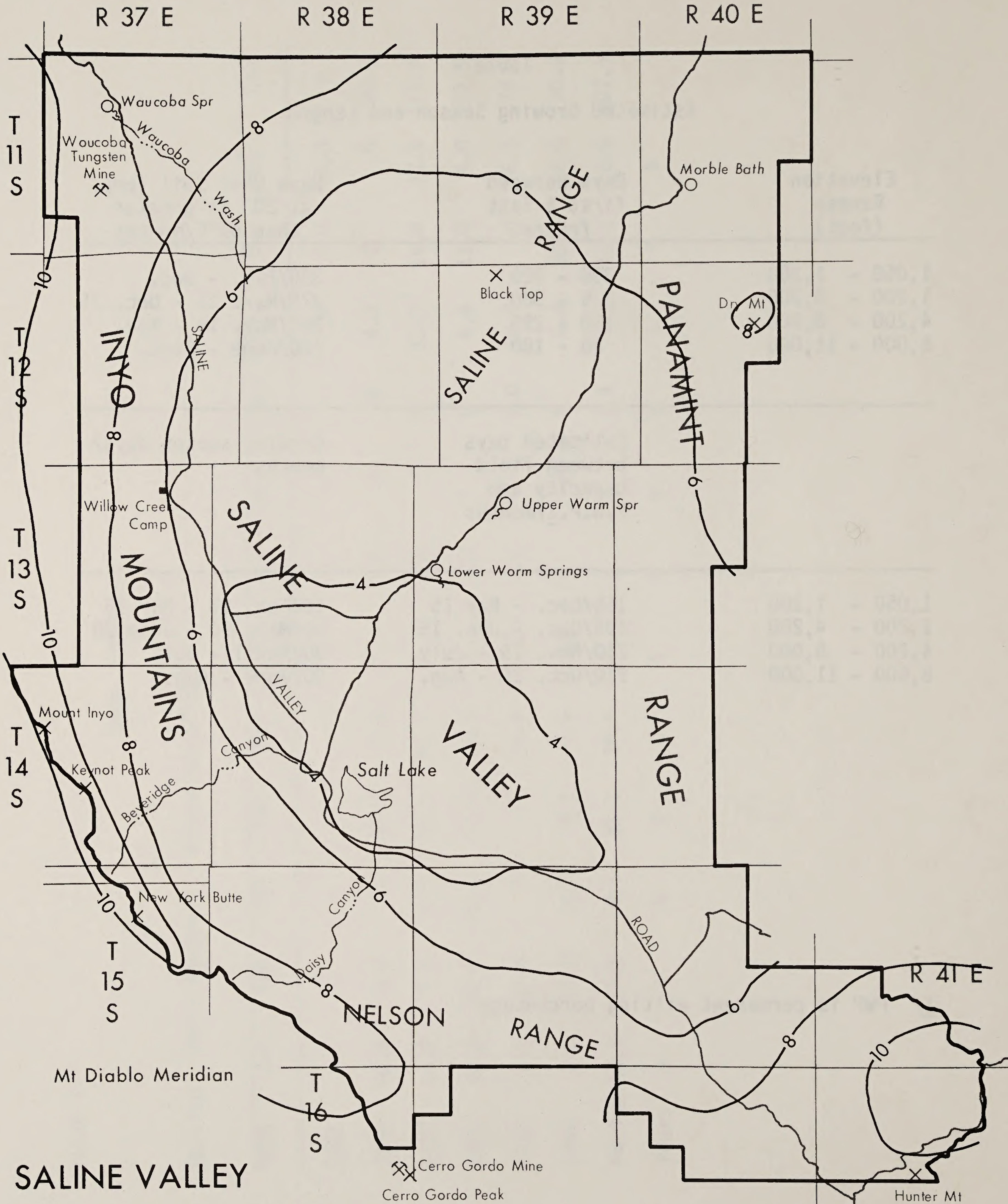
Elevation Ranges (feet)	Days Between first & last freeze	Days When Soil Temp. at 20" is greater than 40°F/months
1,050 - 1,200	300 - 320	330/Feb. - Dec.
1,200 - 4,200	225 - 300	270/Mar. 15 - Dec. 15
4,200 - 8,000	180 - 225	240/Mar. 15 - Nov.
8,000 - 11,000	80 - 180	120/June - Sept.

	Estimated days between field capacity and P.W.P.1/months	Growing season days/ months
1,050 - 1,200	165/Dec. - May 15	50/Feb. 20 - May 15
1,200 - 4,200	195/Dec. - Jan. 15	90/Mar. 20 - June 20
4,200 - 8,000	210/Nov. 15 - July	90/April - July
8,000 - 11,000	270/Oct. 20 - Aug.	90/June - Aug.

1/ PWP is permanent wilting percentage

PRECIPITATION ISOLINE MAP

(INCHES)

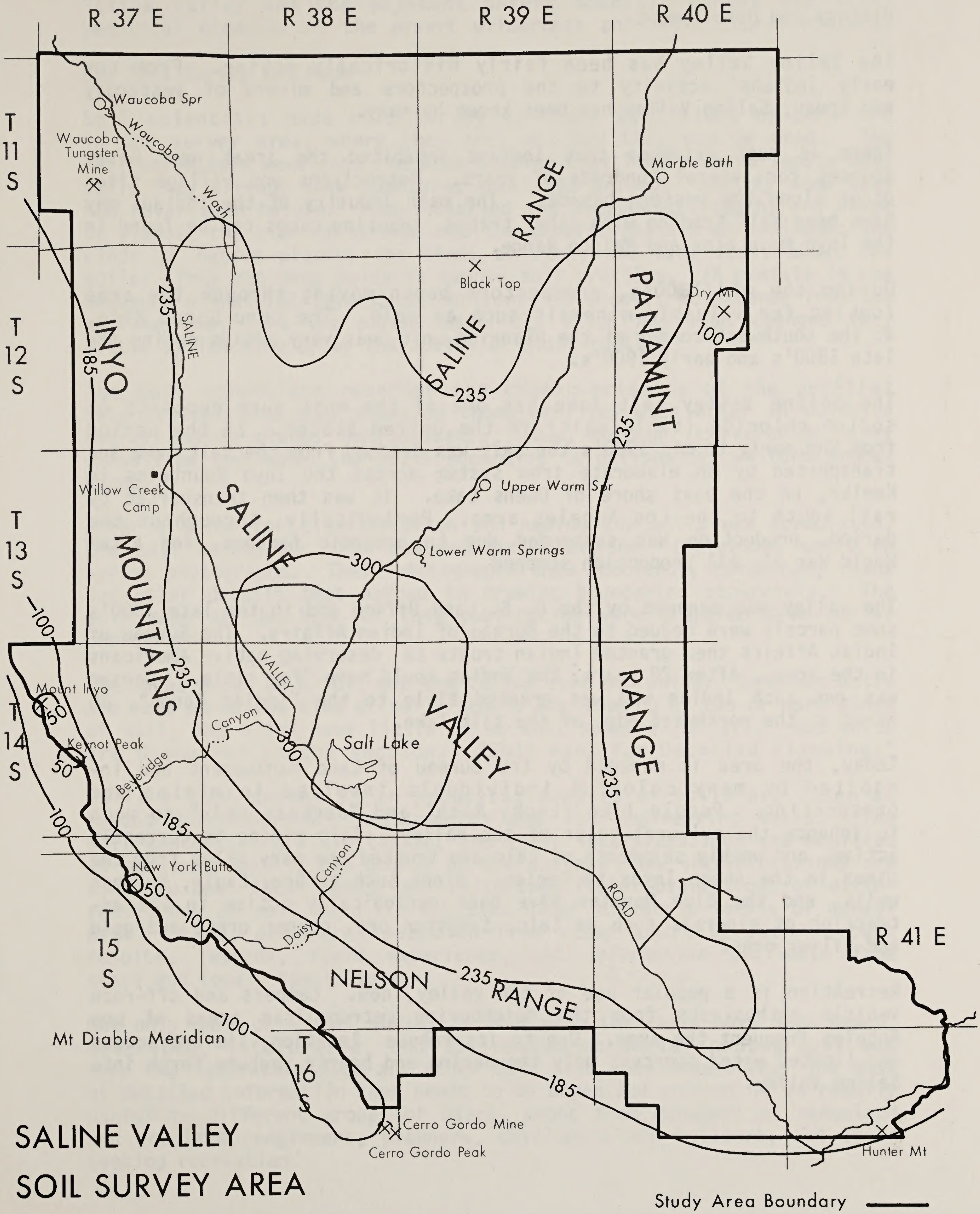


SALINE VALLEY SOIL SURVEY AREA

Study Area Boundary

FROST-FREE SEASON

(DAYS BETWEEN FIRST AND LAST FROST)



History and Development

The Saline Valley has been fairly historically active. From the early Indians' activity to the prospectors and miners of yesterday and today, Saline Valley has been known by many.

There is much evidence that Indians inhabited the areas near water sources for several hundreds of years. Petroglyphs and village sites occur along the western bahadas. The main industry of the Indians may have been salt trading with other tribes. Hunting camps can be found in the Inyo Mountains and Nelson Range.

During the mid 1800's, prospectors began moving through the area looking for valuable minerals such as gold. The Cero Gordo Mine, at the southwest corner of the planning unit, was very active during the late 1800's and early 1900's.

The Saline Valley salt lake has one of the most pure deposits of sodium chloride (table salt) in the United States. In the period from the early to mid 1900's the salt was dredged from the salt lake and transported by an elaborate tram system across the Inyo Mountains to Keeler, on the east shore of Owens Lake. It was then transported by rail south to the Los Angeles area. Periodically, throughout the period, production was suspended due to economic factors, and after World War II, all production stopped.

The valley was managed by the U. S. Land Office and in the late 1800's some parcels were deeded to the Bureau of Indian Affairs. The Bureau of Indian Affairs then granted Indian trusts to deserving native Americans in the area. After 20 years, the Indian could have "fee title." Caesar was one such Indian who was granted title to the "Indian Ranch", 80 acres at the northwest edge of the salt lake.

Today, the area is managed by the Bureau of Land Management and inhabited by many colorful individuals involved in mining and prospecting. People like "Lucky Rich" and "Jackass Andy" do much to inhance the cultural color of the valley. Talc mining is currently active, and weekly shipments of talc are trucked the many miles from the mines in the steep Inyos to Keeler. Mines such as Grey Eagle, Burgess wells, and the Blue Monster have been periodically active in the extraction of minerals such as talc, tungsten ore, copper ores, and gold and silver ores.

Recreation is a popular use of the valley, now. Campers and off-road vehicle enthusiasts from the neighboring metropolitan areas of Los Angeles frequent the area. Due to its remote location, limited access and limited water sources; only the daring and hearty venture forth into Saline Valley.

Saline Valley and its adjacent desert mountain ranges are still beautiful examples of the desert wilderness and its cultural history.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. (A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.)

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with other in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classification and naming the soils was formulated, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, roads and other details that helped in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the section. "Soil Maps for Detailed Planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soil concepts are field tested, and their interpretations are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of managment. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily useful to different groups of users, among them managers of rangeland and woodland, engineers, planners, developers and builders, and those seeking recreation.

General Soil Map for Broad Land Use Planning

The general soil map at the back of this publication shows, in color, the soil units for broad land use planning described in this survey. Each soil unit is a unique natural landscape that has a distinct pattern of soils, of relief, and drainage features. A unit typically consists of one or more soils of major extent and some soils of minor extent. It is named for the major soils. The kinds of soil in one unit can occur in other soil units, but in a different pattern.

The map provides a broad perspective of the soil and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are generally suitable for certain kinds of land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of an area or for selecting a site for a road or buildings or other structures; the kinds of soils in any one soil unit ordinarily differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soil units in the survey area vary widely in their potential for major land uses. Table AA shows the extent of each soil unit and gives general ratings of the potential of each, in relation to the other soil units, for each major land use. Adverse soil properties that pose limitations to the use are indicated. The ratings of soil potential are based on the assumption that practices in common use in the county are used to overcome soil limitations. These ratings reflect the ease of overcoming such soil limitations and the probability of soil problems persisting after such practices are used. The location of existing transportation systems or other kinds of facilities is not considered.

Each unit is rated for <u>watershed</u>, <u>rangeland</u>, <u>intensive recreation areas</u>, and <u>extensive recreation areas</u>. Watershed refers to the ability of the area to hold and store or transport precipitation; considering the erodability, soil depth, runoff, and permeability characteristics of the soil. Rangeland refers to land that is producing vegetation native to the area and the unit's potential for range. Intensive recreation areas are campsites, picnic areas. off-road vehicle uses, and other areas that are subject to heavy traffic. Extensive recreation areas include those used for nature study and as wilderness.

Descriptions of the Soil Units

MISCELLANEOUS AREAS AND SHALLOW SOILS IN DRY MOUNTAINS

11. Torriorthents - Rock outcrop - Theriot

These areas are characterized by extremely steep slopes, numerous drainage channels eroded into soft weathered rock, outcrops of hard rock, land slides and rock slides, and shallow soils over hard or soft rock; supporting little vegetation. Torriorthents make up 50 percent of the unit; Rock outcrop 20 percent; Theriot, 20 percent. Included are 10 percent Badland.

SHALLOW TO DEEP SOILS IN MOUNTAINOUS AREAS:

21. Theriot - Beveridge

These soils are shallow, well to somewhat excessively drained. Slopes are strongly sloping to extremely steep. Theriot soils make up 50 percent and occupy elevations from 4,200 to 8,000 feet. Beveridge soils make up 30 percent and occupy elevations between 8,000 and 11,000 feet. Included are 20 percent rock outcrop, Mexispring, Panamint and Ulida soils. These soils are moderately to severely susceptible to erosion.

22. Mexispring - Panamint - Ulida

These soils are moderately deep to shallow, well to somewhat excessively drained. Ulida has a developed subsoil. This unit consists of soils that are sloping to steep, with moderate to severe erosion hazard. Mexispring makes up 30 percent, Panamint 20 percent, and Ulida 20 percent. Included are 30 percent Ferroburro, Huntmount, rubble land, and rock outcrop.

23. Waucoba - Ferroburro Variant - Waucoba Variant

This Unit consists of sloping to steep, shallow to moderately deep soils. They are well to somewhat excessively drained. The erosion hazard is moderate to slight. Waucoba makes up 30 percent, Ferroburro Variant, 20 percent, and Waucoba Variant, 20 percent. Included are 30 percent rock outcrop, Theriot soils, badland, Torriorthents, and Cliffdown Variant.

24. Rock outcrop - Cryoborolls - Xeric Torriorthents

This Unit consists of steep to extremely steep, moderately coarse textured soils formed from granitic rock. They are well to somewhat excessively drained. Erosion hazard is moderate. Rock outcrop makes up 40 percent of the unit; Cryoborolls, 25 percent, and Xeric Torriorthents 20 percent. Included are 15 percent rubble land, Theriot, Ferroburro, Panamint, Ulida, Beveridge soils, and Torriorthents.

SHALLOW SOILS FORMED ON MONOCLINIC LAVA FLOWS

31. Upspring - Blacktop - Rock outcrop

This unit consists of shallow, sloping to steep soils and outcrops of extrusive igneous rocks. The soils are well to somewhat excessively drained. The soils have a moderate to severe erosion hazard. Upspring makes up 35 percent; Blacktop, 35 percent, and rock outcrop 20 percent. Included are 10 percent, Osobb Variant soils, playas, and cinder land.

32. Tybo Variant

This unit consists of gently sloping, shallow soils. They are well to somewhat excessively drained. Erosion hazard is moderate. Included is 10 percent rock outcrop.

DEEP SOILS IN MAJOR VALLEYS:

41. Yellowrock - Arizo

This unit consists of nearly level to gently sloping, deep, sandy to gravelly soils cut by many drainage channels. The soils are somewhat poorly to excessively drained. The soils are occasionally flooded, and moderately to highly susceptiable to wind and water erosion. Yellowrock makes up 50 percent; Arizo, 40 percent. Included are 10 percent Yermo, Bluewing, Riverwash, and Bunkerhill.

42. Arizo - Riverwash

This unit consists of strongly sloping, deep, very gravelly soils. They are somewhat excessively drained. Erosion hazard is slight. Arizo makes up 75 percent and Riverwash, 15 percent. Included are 10 percent Bluewing soils.

43. Yellowrock - Yermo - Arizo

This unit consists of deep, gravelly soils on sloping fans at the valley edges. They are well to somewhat excessively drained. Yellowrock makes up 35 percent; Yermo, 30 percent, and Arizo, 25 percent. Included are 10 percent Yellowrock Variant, Bunkerhill soils and riverwash.

44. Arizo - Greyeagle Variant - Greyeagle

This unit consists of sloping to strongly sloping, well to somewhat excessively drained soils that are shallow to a duripan, deep sandy and gravelly soils, and deep soils with developed subsoils. They occupy older fans and interfluves at the south end of the Saline Valley. Erosion hazard is moderate. Arizo makes up 45 percent; Greyeagle Variant, 30 percent, and Greyeagle, 20 percent. Included are 5 percent Yellowrock soils and riverwash.

45. Salt Flats - Bunkerhill - Yellowrock Variant

This unit consists of undrained flats of lacustrine origin. Water may pond on the surface for some period of the year. This unit is highly saline. The soils are somewhat poorly drained. Water erosion hazard is slight. Wind erosion hazard is slight when moist and moderate to severe when surfaces are dry. Salt Flats make up 45 percent; Bunkerhill, 40 percent, and Yellowrock Variant, 10 percent. Included are 5 percent Yellowrock and dune land.

46. Arizo Variant

This unit consists of older fans of alluvium derived mainly from extrusive igneous rocks. The soils are strongly sloping, well drained, and have developed subsoils. Erosion hazard is slight due to the close mosaic of rock fragments on the surface. If surface cover is disturbed, the surface soil is highly susceptible to water and wind erosion. Included are 20 percent riverwash, Yellowrock, and Arizo soils.

SOILS IN MOUNTAIN VALLEYS

51. Cliffdown - Bluewing - Arizo

This unit consists of sloping to strongly sloping, deep, coarse to medium textured gravelly soils. They occupy the alluvial fans in the mjor valley between the Saline Range and the Inyo Mountains. Erosion hazard is slight to moderate. Cliffdown makes up 25 percent; Bluewing, 20 percent; and Arizo, 20 percent. Included are 35 percent Yellowrock, Osobb Variant soils and riverwash.

52. Arizo - Yellowrock - Osobb Variant

This unit occupies the large and small mountain valleys. The soils are well drained, deep to shallow, sandy, and gravelly. The soils are slightly to moderately susceptible to erosion. Arizo makes up 40 percent; Yellowrock, 35 percent; and Osobb Variant, 15 percent. Included are 10 percent riverwash.

53. Luckyrich - Ulida - Luckyrich Variant

This unit consists of well drained, deep, moderately coarse, alluvial soils filling small mountain valleys, moderately coarse alluvial soils overlying unrelated granite at moderate depths; and medium textured, residual soils that have developed subsoils, and that are shallow to weathered granite; occupying low ridges that transect the valleys. The erosion hazard is slight to moderate. Luckyrich makes up 35 percent; Ulida, 30 percent; and Luckyrich Variant, 25 percent.

EOLIAN AREAS

61. Dune land

This unit conists of active sand dunes and somewhat stabilized sand dunes. Dune land is excessively drained. Wind erosion hazard is severe, water erosion hazard is slight. Disturbance of stabilizing vegetation causes accelerated wind erosion. Dune land makes up 80 percent. Included are 10 percent Bunkerhill and 10 percent salt flats.

Table AA

POTENTIALS AND LIMITATIONS FOR
SOIL UNITS FOR SPECIFIED USES

Soil Unit	Extent of Area	Watershed Management	Rangeland	Intensive Recreation	Extensive Recreation
11	19.5%	SEVERE	V. POOR	V. POOR	GOOD
21	12.0%	SEVERE	V. POOR	V. POOR	GOOD
22	9.3%	MODERATE	FAIR	FAIR	GOOD
23	1.2%	MODERATE	POOR	V. POOR	GOOD
24	6.9%	MODERATE	FAIR	FAIR	V. GOOD
31	12.2%	SEVERE	V. POOR	V. POOR	GOOD
32	0.4%	MODERATE	POOR	POOR	GOOD
41	12.2%	MODERATE	POOR	FAIR	FAIR
42	2.9%	SEVERE	POOR	POOR	FAIR
43	6.8%	MODERATE	POOR	FAIR	FAIR
44	2.7%	SEVERE	POOR	POOR	FAIR
45	6.4%	SEVERE	V. POOR	V. POOR	POOR
46	0.5%	MODERATE	POOR	POOR	POOR
51	4.1%	MODERATE	POOR	POOR	FAIR
52	0.8%	SLIGHT	FAIR	FAIR	GOOD
53	1.2%	SLIGHT	V. GOOD	GOOD	GOOD
61	0.9%	SEVERE	V. POOR	POOR	GOOD

Soil Maps for Detailed Planning

The kinds of soil (map units) shown on the more detailed soil maps at the back of this publication are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each soil is given in the section "Use and Management of the Soils."

Preceding the name of each map unit is the symbol that identifies the unit on soil map. Each map unit description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated and the management concerns and practices needed are discussed.

A soil map unit represents an area on the landscape and consists mostly of the soil or soils for which the unit is named. Most of the delineations shown on the soil map at the back of this publication are associations of soil series.

Soils that have profiles that are almost alike make up a soil series. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. All the soils in United States having the same series name have essentially the same properties that affect their use and their response to management practices.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristic that affects the use of the soils. On the basis of such differences, a soil series is divided into phases. The name of a soil phase commonly indicates a feature that affects use or management. Example, Arizo very stony loamy sand is one of several phases within the Arizo series.

Some map units are made up of two or more dominant kinds of soil. Several such kinds of map units are shown on the soil map of this survey area.

A soil complex consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Arizo complex is an example.

A soil association is made up of soils that are geographically associated and are shown as one unit on the map. A soil association has considerable regularity in geographic pattern and in the kinds of

soil that make up the association. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for the expected uses of the soils. Dune land - Bunkerhill association is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. The soils that are included in map units are recognized in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places, called miscellaneous areas, are designated on the soil map and given descriptive names. Rock outcrop is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each mapping unit are given in table A, and additional information on properties, limitations, capabilities, and potentials for many soil uses are given for each kind of soil in other tables in this survey. (See "Summary of Tables.") Many of the terms used in describing soils are defined in the Glossary.

TABLE A - Acreage and Proportionate Extent

Map Unit	Acres	%of Survey Area
101	31,595	7.56
102	2,350	0.56
103	3,810	0.91
104	12,970	3.10
105	2,560	0.61
106	12,685	3.03
107	385	0.09
108	13,530	3.24
109	200	0.05
110	1,200	0.29
111	1,995	0.48
112	6,490	1.55
113	600	0.3
114	6,580	1.57

TABLE A - Acreage and Proportionate Extent (continued)

Map Unit	Acres	%of Survey Area
115	1,950	0.47
116	4,500	1.08
117	2,500	0.60
118	12,550	3.00
119	800	0.19
120	2,030	0.49
121	520	0.12
122	10,475	2.5
123	30,230	7.23
124	7,290	1.77
125	9,610	2,30
126	3,660	0.88
127	4,960	1.19
128	84,175	20.14
129	13,340	3.19
130	260	0.06
131	3,100	0.74
132	63,790	15.26
W	200	0.05
133	2,560	0.61
134	1,050	0.25
135	16,940	4.05
136	990	0.24
137	11,200	2.68
138	2,100	0.50
139	28,565	6.83
140	1,600	0.38

SOIL MAP UNIT DESCRIPTIONS

101 Arizo complex, 5 to 15 percent slopes. This map unit is on highly dissected alluvial fans (Plate 1). Slopes are highly complex; characterized by sloping interfluves with moderately steep side slopes. Areas are long and narrow and are 100 to 500 acres in size. The native vegetation is mainly desert scrub and scattered perennial grasses. Elevation is 1200 to 4200 feet. The average annual precipitation is about 4 to 6 inches, the average annual air temperature is 60 to 65 degrees F, and the average frost-free season is 235 to 300 days.

This unit is about 50 percent Arizo very cobbly loamy sand and 35 percent Arizo very cobbly sandy loam. Arizo very cobbly loamy sand is on low dissected drainage terraces and interfluves that receive deposition; and Arizo very cobbly sandy loam is on the more stable interfluves. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent riverwash in the drainage channels and 5 percent gravelly loam soils on remnants of older fans and higher stablized interfluves.

The Arizo very cobbly loamy sand soil is very deep and excessively drained. It formed in alluvium derived dominantly from granitic rocks. Typically, the surface is covered with 30 to 50 percent gravel and cobbles. The surface layer is light brownish gray very cobbly loamy sand about 4 inches thick. The underlying material to a depth of 60 inches is stratified, grayish brown very cobbly sand.

Permeability of the Arizo very cobbly loamy sand soil is very rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

The Arizo very cobbly sandy loam soil is very deep and excessively drained It formed in alluvium derived dominantly from granitic rocks. Typically, the surface is covered with 15 to 35 percent gravel, cobbles, a few stones, and scattered boulders all covered with desert varnish. The surface layer is very pale brown, highly vesicular, very cobbly sandy loam about 4 inches thick. The underlying material to a depth of 60 inches is very pale brown very gravelly loamy sand.

Permeability of the Arizo very cobbly sandy loam soil is moderately rapid to a depth of 4 inches and very rapid below this depth. Available water capacity is about 1.8 to 3.6 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used mainly for wildlife habitat and recreation. This unit can be used for livestock grazing if a suitable source of water is available.

This map unit is poorly suited for recreational development. It is limited mainly by slope and surface rock fragments. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

The potential plant community on this unit is mainly creosote bush, bursage, Fremont dalea, indian ricegrass, and galleta. The average annual production of air-dry vegetation ranges from 50 to 125 pounds. If the range vegetation on the Arizo very cobbly sandy loam soil is in good or excellent condition, the native grasses are mainly galleta and indian ricegrass. The production of vegetation suitable for livestock grazing is limited by low precipitation and sandy soil textures. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases. Therefore, livestock grazing should be managed so that the desired balance of species is maintained in the plant community.

The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are insufficient rainfall immediately following seeding for seed germination.

This unit is limited for livestock watering ponds and other water impoundments because of the seepage potential.

Plate 1. Surface and topographic characteristics of the 101 unit.

<u>102 Arizo Variant very stony loam, 2 to 9 percent slopes.</u> This very deep, well drained soil is on old stabilized alluvial fans. It formed in alluvium derived dominantly from igneous rocks. Slopes are convex.

Areas are characteristically fan-like in shape and are 20 to 50 acres in size. The native vegetation is mainly scattered desert scrub and a few perennial grasses. Elevation is 2000 to 4200 feet. The average annual precipitation is about 5 to 6 inches, the average annual air temperature is 58 to 63 degrees F, and the average frost-free season is 235 to 300 days.

Typically, the surface is covered with 80 to 95 percent gravel, cobbles and stones, arranged in a tight mosaic, and coated with desert varnish. The surface layer is very pale brown very stony loam about about 2 inches thick. The subsoil is pale brown very stony clay loam and very gravelly sandy loam about 5 inches thick. The substratum to a depth of 60 inches or more is light grey and very pale brown extremely gravelly stratified sandy loam to loamy coarse sand.

Included in this unit are small areas of Yellowrock very gravelly loamy fine sand, Arizo very gravelly loamy sand, and riverwash. These inclusions occupy lower fan areas and low drainages marginal to the areas of Arizo Variant soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Arizo Variant soil is moderately slow. Available water capacity is about 1 to 5 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight if desert pavement remains undisturbed. The hazard of soil blowing is slight if desert pavement is undisturbed.

This unit is used mainly for wildlife habitat. It is also used for recreation.

This map unit is poorly suited to recreational development. If this unit is used for recreational development, the main limitations are surface rock fragments and severe erosion hazard if surface pavement is disturbed. Recreation should be limited to hiking and scenic uses.

The present vegetation in most areas is mainly creosote bush, desert holly, and scattered perennial grasses. The production of vegetation suitable for livestock grazing is limited by low rainfall and tight rock fragment mosaic.

The risk of soil blowing increases if the desert pavement is disturbed. Plant cover and surface mosaic can be maintained by limiting vehicular traffic.

103 Badland. This map unit is on steep upland sideslopes and canyon walls. Slope is 30 to 100 percent (Plate 2). Slopes are convex and highly dissected. Areas are usually long and narrow in shape and are 20 to 500 acres in size. The delineations usually follow the major stream canyons at the valley edge of mountain escarpments. Elevation is 2000 to 6500 feet. The average annual precipitation is about 4 to 10 inches, the average annual air temperature is 50 to 65 degrees F, and the average frost-free season is 185 to 300 days.

Included in this unit are small areas of rock outcrop, Torriorthents, riverwash, and Theriot soils. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another. Included areas support sparce vegetation.

Badland is characterized by a steep, highly eroded land form which is composed of soft bedrock. Badland supports no vegetation.

Due to the highly variable nature of badland, permeability and available water capacity are highly variable. Runoff is very rapid, and the hazard of water erosion is moderate to severe. This unit is highly susceptible to landslides.

This unit is used for watershed and wildlife habitat. Steep slopes and the severely eroded character of this unit limits most uses.

Plate 2. Highly eroded character of Badland unit.

<u>104 Beveridge very gravelly sandy loam, 30 to 75 percent slopes.</u> This shallow, somewhat excessively drained soil is on steep mountain side slopes and ridgetops. It formed in residuum derived dominantly from calcareous sedimentary rocks. Slopes are evenly convex. The native vegetation is mainly shrubs and scattered conifers. Elevation is 8,000 to 11,000 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free season is 100 to 185 days.

Typically, the surface is covered with 35 to 70 percent gravel and cobble sized shale fragments. The surface layer is pale brown very gravelly sandy loam and pale brown very gravelly light loam about 10 inches thick. The substratum is very pale brown extremely cobbly loam about 9 inches thick over hard limestone.

Included in this unit is about 10 percent rock outcrop on steep side-hills and ridgetops, 10 percent moderately deep soils with numerous rock fragments in the profile; on toe slopes and in swales, and 10 percent Theriot soils on contacts with units at lower elevations and on south facing slopes. Also included are small areas of Beveridge soils with 5 to 30 percent slopes on ridgetops.

Permeability of this Beveridge soil is moderately rapid. Available water capacity is 1 to 2 inches. Effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for watershed habitat, wildlife, and recreation.

This map unit is poorly suited to recreational development. Slope limits the use of areas of this soil mainly to a few paths and trails, which should extend across the slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Foot and vehicular traffic across slopes causes compaction and surface soil disturbance; resulting in increased runoff and erosion.

Steepness of slope and poor accessability limit this unit for most uses.

The potential plant community on this unit is mainly low sagebrush, indian ricegrass, wildrye and other shrubs and grasses.

105 Blacktop - Rock outcrop complex, 30 to 75 percent slopes.
This map unit is on hills and plateaus. The native vegetation is mainly sparse desert shrubs. Elevations are 4200 to 6500 feet. The average annual precipitation is about 6 to 8 inches, the average annual air temperature is 53 to 55 degrees F, and the average frost-free season is 185 to 235 days.

This unit is 65 percent Blacktop very gravelly sandy loam and 25 percent rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 5 percent Ferroburro Variant on contacts with limestone and 5 percent Osobb soils in very small interplateau valleys and basins.

The Blacktop soil is shallow and somewhat excessively drained. It formed in residuum derived dominantly from extrusive igneous rocks. Typically, the surface is covered with 60 to 80 percent gravel. The Blacktop soil is very pale brown very gravelly sandy loam about 5 inches deep over hard rhyolite.

Permeability of the Blacktop soil is moderate. Available water capacity is low. Effective rooting depth is 4 to 10 inches. Runoff is rapid to very rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

Rock outcrop consists of exposures of hard or weathered rock, and includes areas with 1 to 2 inches of weathered soil material over bedrock.

This unit is used for watershed and wildlife habitat. Steepness of slope and poor accessibility limit this unit for most uses.

The present vegetation in most areas is mainly scattered shadscale and winterfat.

106 Bunkerhill loamy fine sand, 0 to 2 percent slopes. This somewhat poorly drained soil is on the basin rim and in basins. It formed in lacustrine alluvium derived dominantly from igneous and sedimentary rocks. Areas are moderately wide to narrow; semicircular in shape and are 100 to 1250 acres in size. The native vegetation is mainly pickleweed. Elevation is 1050 to 1250 feet. The average annual precipitation is about 4 to 5 inches, the average annual air temperature is 70 to 72 degrees F, and the average frost-free season is 300 to 320 days

Typically, the surface is covered with a brittle crust of saline sand about 1/2 inch thick. The surface layer is light brownish gray loamy fine sand and loam with strata of very fine sand and silt about 15 inches thick. The next layer is a thin, hard, brittle, laminar, sodium and silica cemented laminar layer about 2 inches thick. The substratum to a depth of 28 inches or more is pale brown silt loam with thin lenses of silt and very fine sand. Below this is a buried surface layer of brown loam with thin lenses of silt and very fine sand about 2 inches thick. The underlying material to a depth of 50 inches is brown loam with lenses of silt and very fine sand.

Included in this unit are small areas of salt flats, Yellowrock gravelly loamy fine sand, Yellowrock Variant loam, and dune land. Also included are small areas of soils similar to Bunkerhill that have very wet, reduced, silty material above 40 inches at the margins of the unit adjacent to the salt flat. Included areas make up about 15 percent of the total acreage.

Permeability of this Bunkerhill soil is moderate to. Available water capacity is about 0 to 6 inches. Effective rooting depth is 14 to 20 inches. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate; if surface crust is disturbed wind erosion hazard is severe. This soil is subject to very brief periods of flooding in winter months and during high intensity storms.

This unit is used mainly for wildlife habitat. It is also used for recreation.

This map unit is poorly suited to recreational development. It is limited mainly by flood hazard and soil blowing when surface crust is disturbed.

The present vegetation in most areas is mainly pickleweed.

107 Cinder land. This map unit is on plateaus, hills, and mountains. Slope is 30 to 50 percent (Plate 3). Slopes are convex. Areas are oval to round in shape and are 10 to 50 acres in size. The native vegetation is mainly very widely scattered annual forbs. Vegetation is lacking in most delineations. Elevation is 2000 to 6500 feet. The average annual precipitation is about 4 to 8 inches, the average annual air temperature is 55 to 72 degrees F, and the average frost-free season is 185 to 300 days.

Included in this unit are small areas of Blacktop and Upspring soils. The percentage varies from one area to another.

Cinder land consists of volcanic cones of cinders and other igneous pyroclastic material with low available water capacity.

This unit is used for watershed and wildlife. Slopes and unstable surface conditions limit most uses.

Plate 3. Cinder land, a pile of pyroclastics devoid of vegetation.

108 Cliffdown-Yermo-Arizo association, channeled, 5 to 15 percent slopes. This map unit is on alluvial fans and bahadas peripheral to major valleys. Slopes are irregular to smoothly convex and incised by numerous drainage channels. Areas are long and broad in shape and are 100 to 1000 acres in size. The native vegetation is mainly shrubs and scattered grasses. Elevation is 1,200 to 6,000 feet. The average annual precipitation is about 4 to 8 inches, the average annual air temperature is 52 to 65 degrees F, and the average frost-free season is 185 to 235 days.

This unit is 30 percent Cliffdown very gravelly loam, 25 percent Yermo very gravelly loam, and 20 percent Arizo very gravelly loamy sand. Also in this unit is about 15 percent Bluewing very gravelly loamy sand. Cliffdown is on older fans at elevations of 4100 to 6000 feet, Yermo is on older fans at elevations of 1200 to 4100 feet and Arizo and Bluewing are on younger fans and drainage channel terraces.

Included in this unit are small areas of riverwash in incised channels and Yellowrock soils on younger, lower alluvial fans and floodplains adjacent to the valley floor. Included areas make up about 10 percent of the total acreage.

The Cliffdown soil is very deep and somewhat excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 20 to 30 percent gravel and cobbles with a few scattered stones. The surface layer is pale brown gravelly loam and loam about 5 inches thick. The underlying material to a depth of 60 inches is very pale brown very gravelly loam.

Permeability of the Cliffdown soil is moderately rapid. Available water capacity is about 4.8 to 8 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Yermo soil is very deep and well drained. It formed in alluvium derived dominantly from igneous and sedimentary rock. Typically, the surface is covered with 60 to 75 percent gravel and cobbles with a few scattered stones. The surface layer is light brownish gray very gravelly loam about 4 inches thick. The underlying material to a depth of 60 inches is very pale brown very gravelly loam.

Permeability of the Yermo soil is moderately rapid. Available water capacity is about 4 to 7 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Arizo soil is very deep and somewhat excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 60 to 70 percent gravel, cobbles, and a few widely scattered stones. The surface layer is light brownish gray very gravelly loamy sand about 4 inches thick. The underlying material to a depth of 60 inches is grayish brown very gravelly sand.

Permeability of the Arizo soil is rapid. Available water capacity is about 1.8 to 3.6 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to frequent periods of flooding in winter months.

This unit is used mainly for watershed and wildlife habitat. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available.

The potential plant community on the Cliffdown soil is mainly big sagebrush, spiny hopsage, indian ricegrass, and needle-and-thread. The potential plant community on the Yermo soil is mainly creosote bush, burro bush, salt bush, and needle grass. The potential plant community on the Arizo soil is mainly creosote bush, bursage, indian ricegrass, and galleta. The potential plant community on the Bluewing soil is mainly shadscale, big sagebrush, spiny menodora, bottle brush squirrel tail and other shrubs and grasses. The production of vegetation suitable for livestock grazing is limited by low precipitation and sandy textures of the Arizo and Bluewing soils.

This map unit is poorly suited to recreational development. It is limited mainly by surface rock fragments and slopes. Arizo and Bluewing soils are subject to flooding. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic.

<u>109 Cliffdown Variant, very cobbly loam, 30 to 50 percent slopes</u>. This very deep, well drained soil is on upland side slopes rimming major mountains. It formed in residuum and from colluvium derived dominantly from calcareous sedimentary rocks. Areas are long and narrow in shape and are 10 to 100 acres in size. The native vegetation is mainly pinyon-juniper and sagebrush. Elevation is 5,500 to 7,500 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 50 to 53 degrees F., and the average frost-free season is 185 to 200 days.

Typically, the surface is covered with 25 to 35 percent gravel and cobbles. The surface layer is yellowish brown very cobbly loam and gravelly loam about 18 inches thick. The upper 28 inches of the substratum is light yellowish brown very cobbly sandy loam. The lower part to a depth of 60 inches is very pale brown stony loamy sand. Depth to hard limestone ranges from 40 to 80 inches.

Included in this unit are small areas of Ferroburro Variant on ridges, soils similar to Cliffdown Variant, but averaging fewer than 35 percent rock fragments, on lower toe slopes; and rock outcrop on ridge tops and very sleep, convex side slopes. Included areas make up about 20 percent of the total acreage.

Permeability of this Cliffdown Variant soil is moderate. Available water capacity is about 3.9 to 6.0 inches. Effective rooting depth is 40 to 80 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used mainly for watershed and wildlife habitat. It is also used for recreation. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

The potential plant community on this unit is mainly singleleaf pinyon, Utah juniper, pine bluegrass, galleta, big sagebrush, and other grasses and shrubs.

This unit is well suited to the production of pinyon pine and Utah juniper (Plate 4). The site index for this unit ranges from 45 to 50. It can produce 6 to 10 cords per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The main concerns in producing and harvesting timber are steep slopes and erosion hazard when soil is disturbed.

<u>110 Dune land</u>. This map unit is on the periphery of inland basin salt flats. It formed in eolean materials derived dominantly from igneous and sedimentary rocks. Slope is 5 to 30 percent. Slopes are characterized by hummocky topography. Areas are oval in shape and are 200 to 600 acres in size. The native vegetation is mainly very widly scattered creosote bush and mesquite in the moister swales. Elevation is 1,050 to 1,200 feet. The average annual precipitation is about 4 to 5 inches, the average annual air temperature is 70 to 72 degrees F, and the average frost-free season is 300 to 320 days.

Dune land consists of a system of mobile, low ridges composed of sand-sized particles that are transported by wind. It supports no perennial vegetation (Plate 5).

Included in this unit are small areas of Bunkerhill and Yellowrock Variant overblown by sand in the moister swales. These inclusions support perennial plants.

Permeability of the Dune land is very rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used mainly for wildlife habitat. It is also used for recreation.

If this unit is used for recreational development, the main limitations are soil blowing and complex slopes. Use of this area by off-road vehicles causes disturbance of any stabilizing vegetation. Although by definition, Dune land lacks vegetation, some plants will establish themselves in some of the more stable swales and eventually invade the active dunes themselves; thus stabilizing the dune system.

While use of these areas by off-road vehicles does little to disrupt the dune cycle, vegetation will not establish itself when disturbed (Plate 6).

Plate 4. Production of pinyon and juniper is high on the Cliffdown Variant soil in the 109 unit.

111 Duneland - Bunkerhill association, hummocky 0 to 9 percent slopes. This map unit is on major valley floors peripheral to enclosed basins. Slopes are charcterized by sand ridges and hills with intervening flats and swales (Plate 7). Areas are narrow and semicircular in shape and are 10 to 100 acres in size. The native vegetation is mainly desert scrub, alkali shrubs, and scrub trees. Elevation is 1,050 to 1,250 feet. The average annual precipitation is about 4 to 5 inches, the average annual air temperature is 70 to 72 degrees F, and the average frost-free season is 300 to 320 days.

This unit is 50 percent Dune land and 40 percent Bunkerhill loamy fine sand. Bunkerhill is in the interdune areas and has slopes of 0 to 2 percent, the dunes have 5 to 9 percent slopes.

Plate 5. The frequently windblown, hilly character of the Dune land unit prohibits the growth of stabilizing vegetation except in protected swales.

Plate 6. Creosote bush growing at the edge of the dune land tends to provide some stability as it holds the sands in place.

Plate 7: Bunkerhill soils occupy the foreground with small dunes, surrounding the soils. In the background is the 110 unit.

Included in this unit are small areas of Bunkerhill soils that have been deeply overblown by sand, Yellowrock, and Yellowrock Variant. Included areas make up about 10 percent of the total acreage.

Dune land consists of a system of low, mobile ridges. Textures are predominately sand to a depth of 60 inches or more. Where dunes have formed over the Bunkerhill soil, textures below 40 inches are loamy fine sand.

Permeability of the Dune land is very rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

The Bunkerhill soil is somewhat poorly drained. It formed in lacustrine alluvium and eolian materials derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with a brittle salty crust about 1/2 inch thick. The surface layer is light brownish gray loamy fine sand and grayish brown loam with lenses of very fine sand and silt about 15 inches thick. The next layer is a hard, laminar, sodium-silica cemented duripan about 2 inches thick. The substratum to a depth of 28 inches or more is pale brown silt loam with thin lenses of silt and very fine sand. Below this is a buried surface

layer of brown loam with thin lenses of very fine sand and silt about 2 inches thick. The underlying material to a depth of 60 inches is brown loam with thin lenses of very fine sand and silt.

Permeability of the Bunkerhill soil is moderate. Available water capacity is about 0 to 6 inches. Effective rooting depth is 14 to 20 inches. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight if crust remains intact and severe if crust is disturbed. This soil is subject to occasional periods of flooding in winter months and during high intensity storms.

This unit is used mainly for wildlife habitat. It is also used for recreation.

If the Dune land is used for recreational development, the main limitations are sandy textures and slope. Off-road vehicle use in the dunes cause limited damage to the dune itself, but where vegetation occurs, the disturbance of stabilizing vegetation causes accelerated wind erosion and reversion to the active dune state.

If the Bunkerhill soil is used for recreational development, the main limitations are brief flooding. Vehicular travel disrupts the surface crust and causes accelerated wind erosion. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic. Protection from flood is needed.

The present vegetation in most areas is mainly pickleweed and scattered mesquite and creosote bush.

<u>112 Ferroburro-Rock outcrop complex, 50 to 75 percent slopes</u>. This map unit is on ridges and mountain side slopes. Slopes are convex. The native vegetation is mainly pinyon - juniper-sagebrush. Elevation is 6,000 to 8,000 feet. The average annual precipitation is about 6 to 10 inches, the average annual air temperature is 53 to 55 degrees F, and the average frost-free season is 185 to 235 days.

This unit is 35 percent Ferroburro cobbly fine sandy loam and 30 percent rock outcrop. Also in this unit is about 15 percent Mexispring. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent Panamint soils in protected swales, 5 percent Luckyrich soils also in swales, 5 percent Ulida soils on stable areas upslope of rock outcrops, and 5 percent rubble land and very deep colluvial soils at the bases of mountains slopes and in steep drainages. Also included are small areas of riverwash in drainages. The percentage varies from one area to another.

The Ferroburro soil is shallow and well drained. It formed in residuum derived dominantly from granitic rocks. Typically, the surface is covered with 5 to 10 percent cobbles and 15 percent gravel. The surface layer is brown cobbly fine sandy loam about 3 inches thick. The underlying material to a depth of 20 inches is brown and light yellowish brown cobbly sandy loam. Weathered quartz monzonite is at a depth of 20 inches. Depth to weathered granitic rock ranges from 18 to 20 inches.

Permeability of the Ferroburro soil is moderately rapid to a depth of 20 inches and very slow below this depth. Available water capacity is about 2 inches. Effective rooting depth is 18 to 20 inches. Runoff is very rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

Rock outcrop consists of exposures of bare granitic rock.

This unit is used mainly for watershed and wildlife. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available and access is provided.

If this unit is used for recreational development, the main limitations are steepness of slope and surface rock fragments. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on the Ferroburro soil is mainly single leaf pinyon, big sagebrush, green mormon tea, black sagebrush, spiny hopsage, rock gooseberry, and Utah juniper (Plate 8). If the range vegetation on the Ferroburro soil is in good or excellent condition, the native grasses are mainly desert needlegrass, needle and thread, and squirreltail.

The production of vegetation suitable for livestock grazing is limited by shallow soils and low water holding capacity. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases. Therefore, livestock grazing should be managed so that the desired balance of species is maintained in the plant community. Steepness of slope severely limits this unit for grazing.

The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are steepness of slope, low water capacity, and rapid runoff.

Slope limits access by livestock and results in overgrazing of the less sloping areas. Livestock grazing should be managed to protect the unit from excessive erosion.

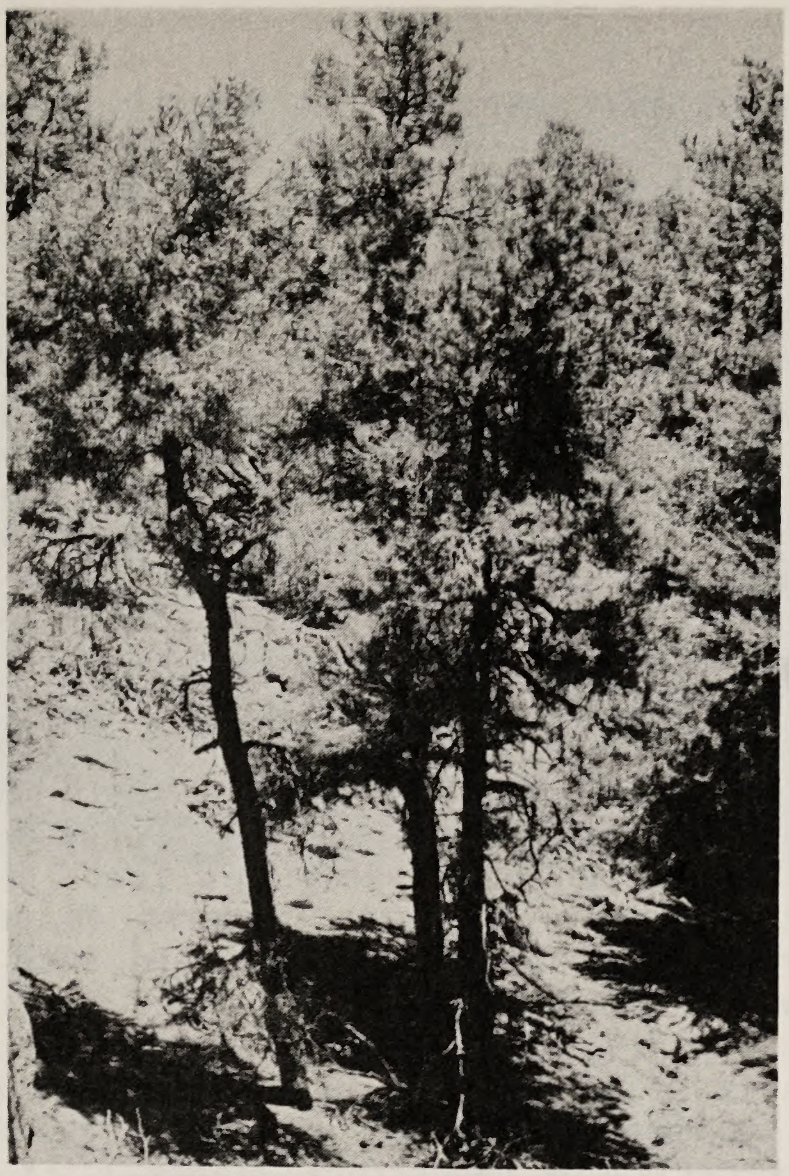


Plate 8. Although the Ferroburro soils are shallow, they support a fairly good stand of small pinyon pine trees and a fair cover of big sagebrush in some areas of the 112 unit.

113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes. This moderately deep, well drained soil is on mountain ridges and sideslopes. It formed in residuum derived dominantly from calcareous sedimentary rocks. Slopes are complexly convex. Areas are irregular in shape and are 50 to 500 acres in size. The native vegetation is mainly sagebrush and scattered conifers. Elevation is 5,500 to 8,000 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 50 to 53 degrees F, and the average frost-free season is 185 to 200 days.

Typically, the surface is covered with 5 to 15 percent cobbles and stones. The surface layer is pale brown stony sandy loam about 8 inches thick. The substratum is pale brown cobbly fine sandy loam about 23 inches thick over weathered limestone. Depth to weathered calcareous sedimentary rock ranges from 20 to 40 inches.

Included in this unit are small areas of outcrops of limestone and granite on ridges and steep sideslopes, Cliffdown Variant soils on concave hillsides and convex toe slopes, soils that are less than 20 inches to weathered or hard rock on narrow ridge tops and near rock outcrops, and a moderately deep, loamy soil with a weak subsoil layer developing in flats with slopes of 5 to 8 percent. Included areas make up about 20 percent of the total acreage.

Permeability of this Ferroburro Variant soil is moderately rapid. Available water capacity is about 2 to 5 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used mainly for watershed and wildlife habitat. It is also used for recreation. This unit can be used for firewood harvest and livestock grazing on the lesser slopes.

If this unit is used for recreational development, the main limitations are surface rock fragments. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

This unit is moderately suited to the production of pinyon pine and Utah juniper. It can produce about 3 to 5 cords per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The average stand is about 100 trees per acre averaging 8 feet long and 4 inches in diameter for their length. The main concerns in producing and harvesting timber are erosion hazard, slopes, and site reclamation difficulty due to low precipitation.

Minimizing the risk of erosion is essential in harvesting timber. After harvesting, reforestation must be carefully managed to reduce competition from undesirable understory plants. If the site is not adequately prepared, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. The moderate available water capacity generally influences seedling survival in areas where understory plants are numerous. Hand planting of nursery stock is usually necessary to establish or improve a stand.

Conventional methods of harvesting timber are difficult to use because of slope.

The potential plant community on this unit is mainly big sagebrush, pinyon-juniper, and perennial grasses. If the range vegetation on this unit is in good or excellent condition, the native grasses are mainly needle-and-thread, galleta, squirrel tail, and pine bluegrass. The production of vegetation suitable for livestock grazing is limited by precipitation. Slope limits access by livestock and results in overgrazing of the less sloping areas.

114 Greyeagle - Arizo association, channeled 5 to 9 percent slopes. This map unit is on older, uplifted, and highly dissected alluvial fans and terraces (Plate 9). Slopes are highly irregular, characterized by dissected drainages and sloping interfluves with strongly sloping sides. The native vegetation is mainly desert shrubs, forbs, and a few grasses. Elevation is 2,000 to 4,200 feet. The average annual precipitation is about 4 to 8 inches, the average annual air temperature is 58 to 63 degrees F, and the average frost-free season is 230 to 300 days.

Plate 9. Surface and topographic characteristics of the 114 unit.

This unit is 40 percent Greyeagle very stony loam and 35 percent Arizo very gravelly loamy sand. Greyeagle is on the higher, stable interfluves. Arizo is in the drainages and on less stable interfluves.

Included in this unit is about 15 percent riverwash in deeply incised, active drainages and 10 percent loamy textured soils that have developed subsoil layers on remnants of older, higher fan-terraces.

The Greyeagle soil is shallow and somewhat excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 60 to 80 percent gravel and cobbles and stones. The surface layer is very pale brown, highly vesicular (Plate 10), very stony loam and very pale brown gravelly sandy loam about 6 inches thick. The upper 2 inches of the underlying material is very pale brown very gravely sandy loam. The next 16 inches is a lime-silica indurated duripan. The lower part to a depth of 60 inches is very pale brown, very stratified, extremely gravelly loamy sand to sand.

Permeability of the Greyeagle soil is moderately rapid in the surface and very slow in the duripan. Available water capacity is about .5 to 1.7 inches. Effective rooting depth is 8 to 14 inches. Runoff is medium, and the hazard of water erosion is moderate if surface is undisturbed and severe if disturbed (Plate 11). The hazard of soil blowing is moderate if surface is undisturbed and severe if disturbed.

Plate 10. Highly fragile vesicular surface ped of the Greyeagle soils collapses very easily with traffic.

Plate 11. Dense surface rock fragment "mosaic" on the Greyeagle soils provides very good protection against erosion.

The Arizo soil is very deep and somewhat excessively drained. It formed in alluvium derived dominantly from granitic and sedimentary rocks. Typically, the surface is covered with 50 to 60 percent gravel and cobbles with 2 to 5 percent stones and boulders. The surface layer is pale brown very gravelly loamy sand about 4 inches thick. The substratum to a depth of 60 inches or more is pale brown very cobbly loamy sand and very gravelly sand.

Permeability of the Arizo soil is rapid. Available water capacity is about 2 to 3 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to frequent periods of flooding in winter months and during high intensity storms.

This unit is used mainly for wildlife habitat. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available.

If this unit is used for recreational development, the main limitations are surface rock fragments, irregular slope, and erosion hazard on disturbed surfaces of the Greyeagle soils. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on this unit is mainly creosote bush, burro bush, Anderson's thorn bush, spiny hopsage and buckwheat. The potential range grasses in most areas are mainly indian ricegrass, desert needlegrass, and galleta. The production of vegetation suitable for livestock grazing is limited by low precipitation, shallow soils, and low available water capacity.

<u>115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.</u> This map unit is on old, uplifted alluvial fan and terrace remnants that have been dissected by numerous drainages The native vegetation is mainly desert shrubs. Elevation is 3,800 to 4,200 feet. The average annual precipitation is about 5 to 8 inches, the average annual air temperature is 60 to 63 degrees F, and the average frost-free season is 235 to 280 days.

This unit is 50 percent Greyeagle Variant bouldery sandy loam and 30 percent Arizo very cobbly loamy fine sand. Greyeagle Variant is on the old, uplifted fan-terrace remnants and Arizo is in the incised drainages.

Included in this unit are small areas of riverwash in active drainage channels, Yermo soils on lower, younger interfluves, yellowrock soils on contacts with units mapped on floodplains and sandy benches; and steep terrace escarpments that have loamy, very gravelly and very cobbly soils.

The Greyeagle Variant soil is shallow and well drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 5 to 10 percent gravel, cobbles, stones, and boulders. The surface layer is brown bouldery sandy loam and brown very cobbly sandy loam about 5 inches thick. The upper 6 inches of the subsoil is yellowish brown very cobbly heavy sandy loam. The lower 3 inches is light yellowish brown very cobbly sandy loam. The underlying material to a depth of 60 inches is a weakly cemented duripan with thin opal lamina between layers of very bouldery and gravelly, very calcareous sandy loam.

Permeability of this Greyeagle Variant soil is moderately rapid to a depth of 14 inches and very slow below this depth. Available water capacity is about .5 to 1.5 inches. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Arizo soil is very deep and somewhat excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 60 to 70 percent gravel, cobbles, and a very few stones and boulders. The surface layer is pale brown very cobbly loamy fine sand about 3 inches thick. The underlying material to a depth of 60 inches is grayish brown very cobbly sand.

Permeability of the Arizo soil is very rapid. Available water capacity is about 2 to 3 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is subject to frequent periods of flooding in winter months and during high intensity storms.

This unit is used mainly for wildlife. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available.

The Greyeagle Variant soil is poorly suited to recreational development. It is limited mainly by surface boulders, and shallow soils. The Arizo soil is poorly suited to recreational development. It is limited mainly by surface rock fragments, sandy textures, and flooding. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Protection from flood is needed.

The potential plant community on this unit is mainly creosote bush, Anderson's thorn bush, burro bush, and spiny hopsage. If the range vegetation on this unit is in good or excellent condition, the native grasses are mainly desert needlegrass, galleta, and indian ricegrass. The production of vegetation suitable for livestock grazing is limited by low precipitation, shallow soils and low available water capacity.

116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slope. This map unit is on steep mountain slopes and ridges. Slope is 30 to 75 percent. Slopes are concave for the Huntmount soils and convex for the Ferroburro soils. The native vegetation is mainly conifers and sagebrush (Plate 12). Elevation is 5,000 to 7,000 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 50 to 53 degrees F, and the average frost-free season is 185 to 235 days.

This unit is 30 percent Huntmount bouldery fine sandy loam, 25 percent Ferroburro gravely sandy loam, and 25 percent rock outcrop. Also in this unit is about 15 percent Panamint cobbly very fine sandy loam. Huntmount soils are on north facing slopes of 30 to 50 percent and on toe slopes and in protected swales; Ferroburro soils are on south facing slopes of 30 to 75 percent; rock outcrop occupyies ridge tops and the upper reaches of slopes of 50 to 75 percent; and Panamint soils are on north facing slopes of 50 to 75 percent and south facing slopes of 30 to 50 percent.

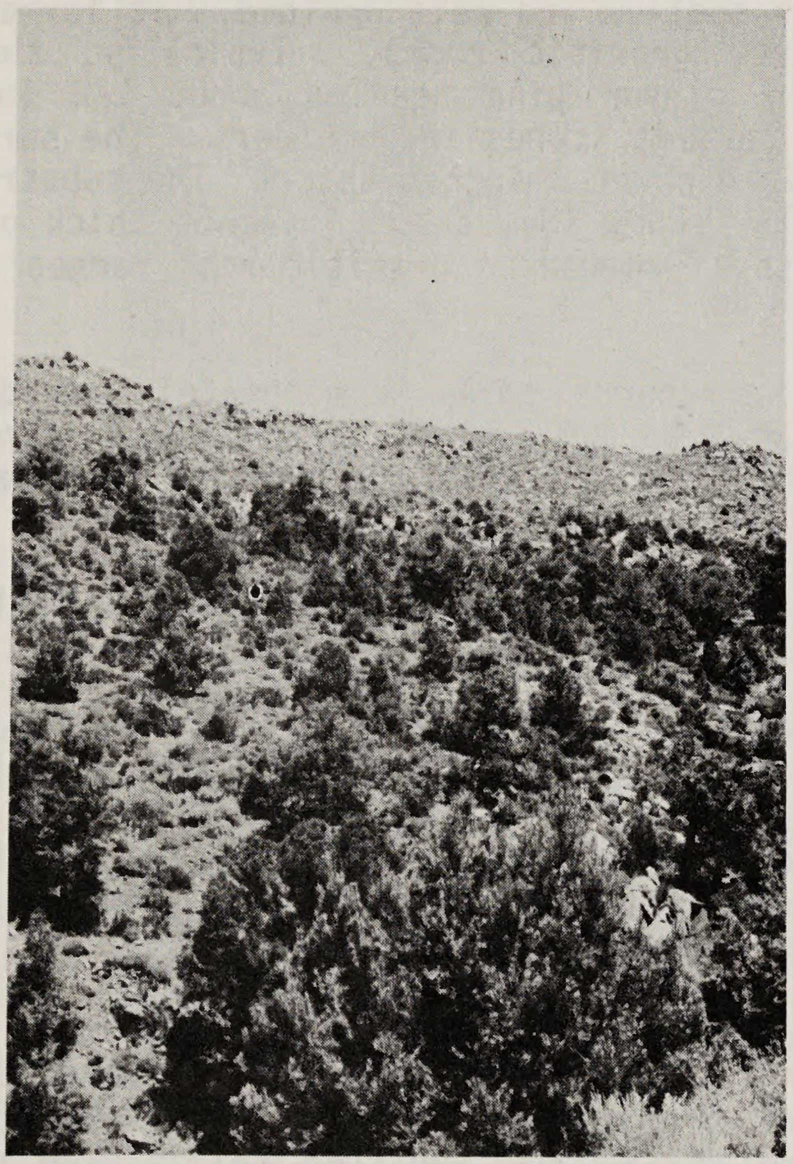


Plate 12. The 116 unit's varied topographic character.

Included in this unit are small areas of Ferroburro Variant and Ulida soils and a soil similar to Huntmount with bedrock at less than 60 inches. Included areas make up about 5 percent of the total acreage.

The Huntmount soil is very deep and well drained. It formed in residuum and colluvium derived dominantly from granitic rocks. Typically, the surface is covered with a mat of pinion pine needles about 1/2 inch thick and 15 to 25 percent cobbles, stones, and boulders. The surface layer is brown bouldery fine sandy loam and brown fine sandy loam about 27 inches thick. The subsoil is brown stony heavy sandy loam and mixed strong brown cobbly loam about 16 inches thick. The substratum is mixed light reddish brown, brown, and strong brown stony loam about 19 inches thick over weathered quartz monzonite. Depth to weathered granitic rock is greater than 60 inches.

Permeability of this Huntmount soil is moderately. Available water capacity is about 6 to 7.8 inches. Effective rooting depth is 40 to greater than 60 inches. Runoff is moderate, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Ferroburro soil is shallow and well drained. It formed in residuum derived dominantly from granitic rocks. Typically, the surface is covered with a mat of pinyon pine needles about 1/2 inch thick and littered with .1 to 1 percent stones and boulders. The surface layer is brown gravelly sandy loam about 6 inches thick. The substratum is light yellowish brown gravelly sandy loam about 8 inches thick over weathered quartz monzonite. Depth to weathered granitic rock ranges from 10 to 20 inches.

Permeability of the Ferroburro soil is moderately rapid. Available water capacity is about 1 to 2.5 inches. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used mainly for watershed and wildlife habitat. It is also used for recreation and livestock grazing.

This map unit is poorly suited to recreational development. It is limited mainly by steepness of slope and surface rock fragments. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

The present vegetation in most areas is mainly pinyon pine and big sagebrush. If the range vegetation on this unit is in good or excellent condition, the native grasses are mainly needle-and-thread, desert needlegrass, pine blue grass, and squirrel tail. The production of vegetation suitable for livestock grazing is limited by tree and shrub canopy and precipitation.

The Huntmount soil is well suited to the production of pinyon pine for firewood (Plate 13). It can produce 10 cords per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The main concerns in producing and harvesting timber are steep slopes. Minimizing the risk of erosion is essential in harvesting timber. After harvesting, reforestation must be carefully managed to reduce competition from undesirable understory plants. Brushy plants such as big sagebrush limit natural regeneration of pinyon pine. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are pinyon pine and Utah juniper. Planting trees on the contour helps to control erosion. Conventional methods of harvesting timber are difficult to use because of slope. If the Huntmount soils are left bare, erosion is accelerated and slopes become less stable resulting in increased sedimentation and soil slippage.

Plate 13. The production of pinyon pine in the Huntmount soil is fairly high for soils in the Saline Valley Soil Survey.

<u>117 Luckyrich - Ulida - Luckyrich Variant association, 0 to 15 percent slopes.</u> This map unit is on alluvial fans and basins with intervening ridges in intermountain valleys. Slopes are complex, characterized by nearly level valley bottoms, gently sloping valley margins, and rounded longitudinal ridges. The native vegetation is mainly sagebrush. Elevation is 4,500 to 6,500 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 53 to 55 degrees F., and the average frost-free season is 185 to 235 days.

This unit is 35 percent Luckyrich gravelly sandy loam, 35 percent Ulida loamy coarse sand, and 25 percent Luckyrich Variant loamy coarse sand. Luckyrich is on the alluvial apron marginal to the adjacent uplands, with slopes of 5 to 15 percent, Ulida is on the longitudinal ridges, with slopes of 5 to 9 percent, and Luckyrich Variant is in the valley bottom, between the ridges; with slopes of 0 to 5 percent.

Included in this unit are small areas of Mexispring soils at contacts with the adjacent steeper uplands and soils similar to Luckyrich that have weathered granite at 20 to 40 inches. Included areas make up about 10 percent of the total acreage.

The Luckyrich soil is deep and well drained. It formed in alluvium derived dominantly from granitic rocks. Typically, the soil is pale brown and light yellowish brown gravelly sandy loam about 40 inches deep over unrelated weathered granite.

Permeability of the Luckyrich soil is moderately rapid. Available water capacity is about 2.4 to 7.8 inches. Effective rooting depth is greater than 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Ulida soil is shallow and well drained. It formed in residuum derived dominantly from granitic rocks. Typically, the surface layer is brown loamy coarse sand and brown sandy loam about 5 inches thick. The subsoil is mixed reddish yellow sandy clay loam about 10 inches thick. The substratum is yellow gravelly sandy loam about 4 inches thick over weathered quartz monzonite. Depth to weathered granitic rock ranges from 10 to 20 inches.

Permeability of the Ulida soil is moderately slow. Available water capacity is about 1 to 3 inches. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Luckyrich Variant soil is very deep and well drained. It formed in alluvium derived dominantly from granitic rocks. The surface layer is pale brown loamy coarse sand and sandy loam about 16 inches thick. The substratum to a depth of 60 inches or more is pale brown, weakly stratified sandy loam to sand.

Permeability of the Luckyrich Variant soil is moderately rapid. Available water capacity is about 5 to 7 inches. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to brief periods of flooding in winter months.

This unit is used mainly for wildlife. It is also used for recreation and livestock grazing.

This map unit is moderately suited to recreational development. It is limited mainly by slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on this unit is mainly big sagebrush and other shrubs and perennial grasses (Plate 14). If the range vegetation on this unit is in good or excellent condition, the native grasses are mainly cheat grass, squirreltail, indian ricegrass and basin wild rye. The production of vegetation suitable for livestock grazing is limited by precipitation and low available water capacity of the Ulida soils. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases. Therefore, livestock grazing should be managed so that the desired balance of species is maintained in the plant community.

The suitability of this unit for rangeland seeding is fair. The main limitations for seeding are climate and the shallow Ulida soils. The plants selected for seeding should meet the seasonal requirements of livestock or wildlife, or both. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management.

This unit is limited for livestock watering ponds and other water inpoundments because of the seepage potential.

Luckyrich Variant soils are well suited to agricultural development.

118 Mexispring - Luckyrich - Panamint association, 15 to 50 percent slopes. This map unit is on mountains. Slopes are very irregular, predominately convex with intervening, concave swales and drainages (Plate 15). The native vegetation is mainly joshua trees and desert shrubs. Elevation is 4,000 to 7,000 feet. The average annual precipitation is about 6 to 8 inches, the average annual air temperature is 53 to 55 degrees F., and the average frost-free season is 185 to 235 days.

This unit is 40 percent Mexispring very cobbly sandy loam, 30 percent Luckyrich gravelly sandy loam, and 25 percent Panamint cobbly very fine sandy loam. Mexispring is on steep, south facing slopes and ridgetops,

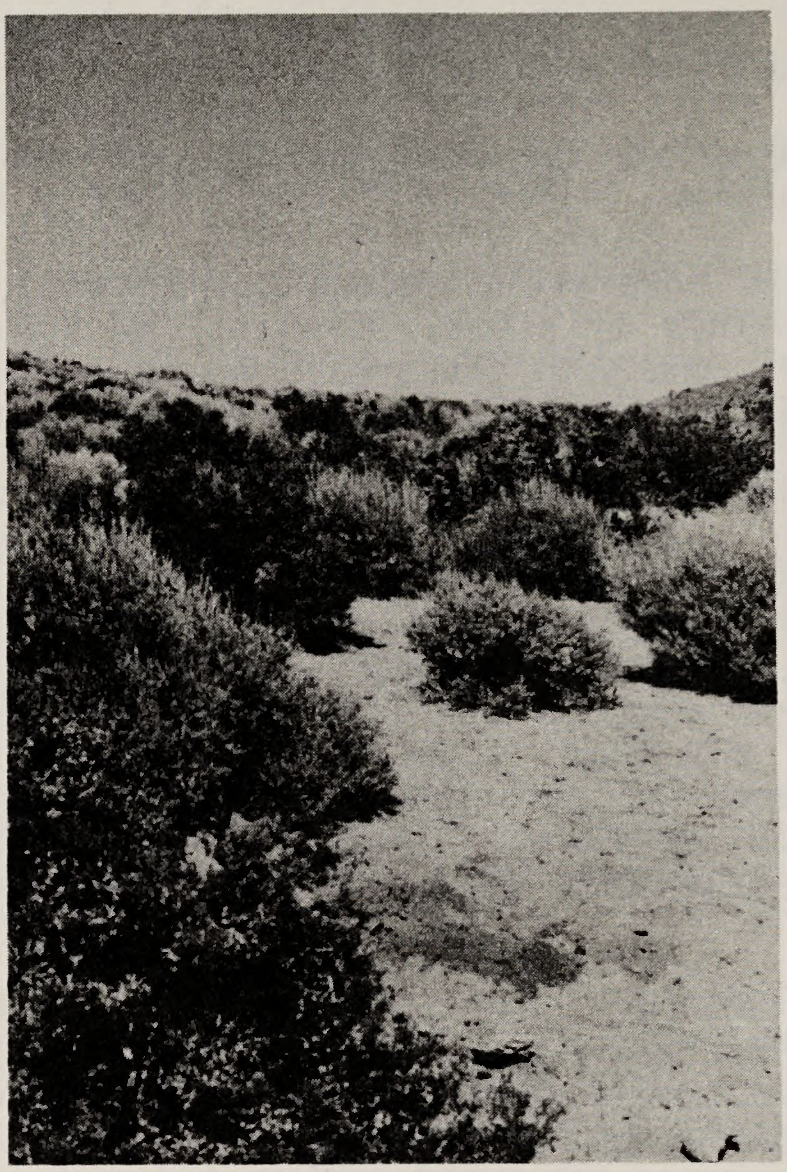


Plate 14. Vegetation production is fairly high on the Luckyrich soils due to their depth, moisture regime, and moderately coarse textures.

Luckyrich is in strongly sloping, small alluvial valleys and swales filled with alluvium; and Panamint is on moderately steep, north facing slopes and in concave upland areas.

Included in this unit are small areas of rock outcrop and riverwash. Included areas make up about 5 percent of the total acreage.

The Mexispring soil is shallow and somewhat excessively drained. It formed in residuum derived dominantly from granitic rocks. Typically, the surface is covered with 35 to 40 percent gravel, cobbles, and a few scattered stones. The soil is pale brown very cobbly sandy loam about 6 inches deep over weathered quartz monzonite. Depth to weathered granitic rock ranges from 4 to 14 inches.

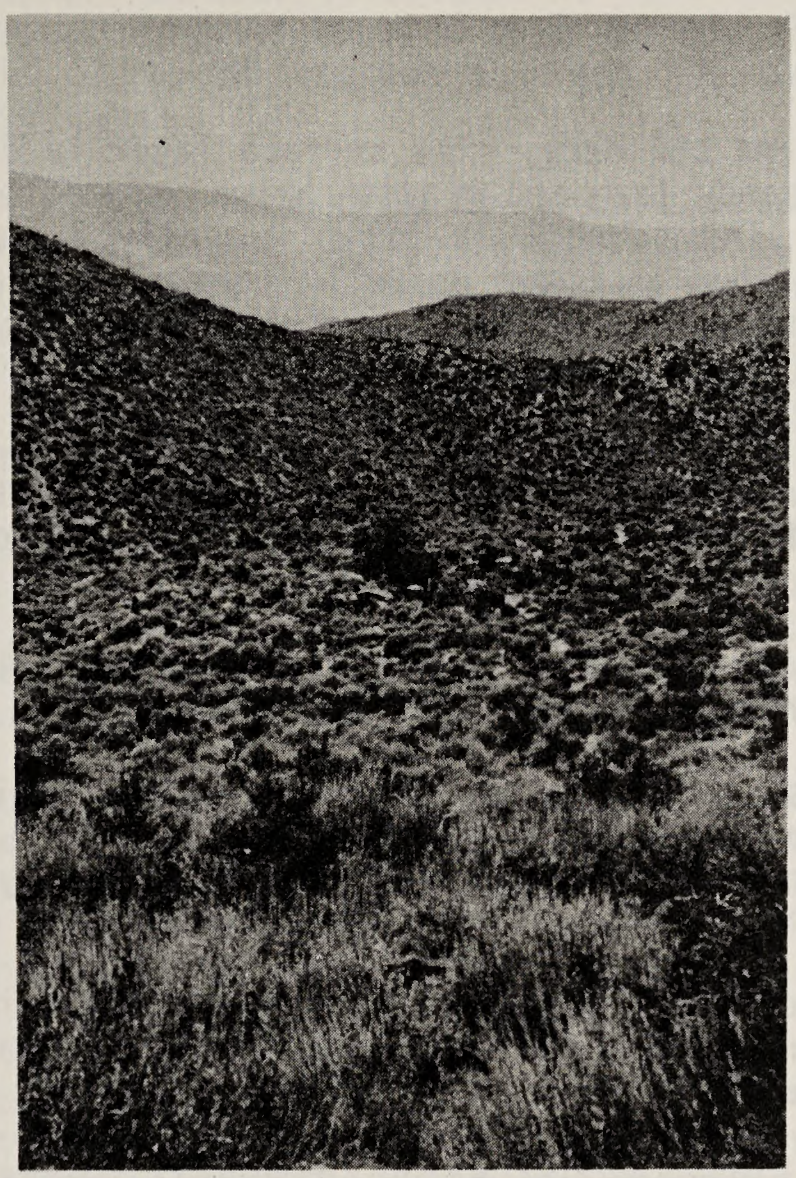


Plate 15. Topographic character of the 118 unit; Panamint in the foreground, Luckyrich, midground; and Mexispring, background.

Permeability of the Mexispring soil is moderately rapid to a depth of 6 inches and very slow below this depth. Available water capacity is about .2 to 1.4 inches. Effective rooting depth is 4 to 14 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Luckyrich soil is deep and well drained. It formed in alluvium derived dominantly from granitic rocks. The soil is pale brown and light yellowish brown gravelly sandy loam about 40 inches deep over unrelated, weathered granitic rock.

Permeability of the Luckyrich soil is moderately rapid. Available water capacity is about 5.4 to 7.8 inches. Effective rooting depth is greater than 40 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Panamint soil is moderately deep and well drained. It formed in residuum derived dominantly from granitic rocks. Typically, the surface is covered with 25 to 35 percent gravel, cobbles and widly

scattered stones and boulders. The surface layer is dark grayish brown cobbly very fine sandy loam and grayish brown very fine sandy loam about 6 inches thick. The subsoil is brown gravelly loam about 12 inches thick. The substratum is brown gravelly loam about 6 inches thick over weathered quartz monzonite Depth to weathered granitic rock ranges from 20 to 40 inches.

Permeability of the Panamint soil is moderately. Available water capacity is about 2.6 to 6 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of soil blowing is severe.

This unit is used mainly for watershed and wildlife habitat. It is also used for recreation and livestock grazing.

This map unit is poorly suited to recreational development. It is limited mainly by steepness of slope and surface rock fragments. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on this unit is mainly California buckwheat, Mormon tea, joshua trees, big sagebrush, and Anderson's thornbush. If the range vegetation on this unit is in good or excellent condition, the native grasses are mainly desert needlegrass, galleta, and indian ricegrass. The production of vegetation suitable for livestock grazing is limited by precipitation and low available water capacity of the Mexispring soils. The Panamint and Luckyrich soils produce more vegetation than the Mexispring soils due to their higher effective soil moisture.

The suitability of this unit for rangeland seeding is fair. The main limitations for seeding are climate and the shallow soils of the Mexispring series. The plants selected for seeding should meet the seasonal requirements of livestock or wildlife, or both. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Water for livestock must be brought in or transported by pipe from nearby springs.

<u>119 Mexispring-Ulida association, 30 to 50 percent slopes.</u> This map unit is on foothills surrounding intermountain valleys. Slopes are complex; generally convex for the Mexispring soils and even or slightly concave for the Ulida soils. The native vegetation is mainly joshua

trees - pinyon - desert shrubs. Elevation is 4,000 to 6,500 feet. The average annual precipitation is about 6 to 8 inches, the average annual air temperature is 53 to 55 degrees F., and the average frost-free season is 185 to 235 days.

This unit is 40 percent Mexisping very cobbly sandy loam and 30 percent Ulida loamy coarse sand. Also in this unit is about 15 percent Panamint cobbly very fine sandy loam. Mexispring is on southfacing slopes, ridge tops and the steeper portion (45% to 50%) of north facing slopes; Ulida is in swales; concave, less steep (30% to 35%) south facing toe slopes and steeper (45% to 50%), north facing slopes; Panamint is on less steep (30% to 35%) north facing slopes and in protected areas.

Included in this unit are small areas of rock outcrop, Luckyrich, Luckyrich Variant, Ferroburro, Huntmount, and a soil similar to the Ulida that has red hues in the subsoil and is formed on basaltic extrusions. Included areas make up about 15 percent of the total acreage.

The Mexispring soil is shallow and somewhat excessively drained It formed in residuum derived dominantly from granitic rocks. Typically, the surface is covered with 35 to 40 percent gravel, cobbles, and a few stones. The soil is pale brown very cobbly sandy loam and pale brown very gravelly sandy loam about 6 inches deep over weathered quartz monzionite.

Permeability of the Mexispring soil is moderately rapid to a depth of 6 inches and very slow below this depth. Available water capacity is about 0.5 to 1.4 inches. Effective rooting depth is 4 to 14 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Ulida soil is shallow and well drained. It formed in residuum derived dominantly from granitic rocks. Typically, the surface layer is brown loamy coarse sand and brown sandy loam about 5 inches thick. The subsoil is mixed reddish yellow sandy clay loam about 10 inches thick. The substratum is yellow gravelly sandy loam about 4 inches thick over weathered quartz monzonite. Depth weathered granitic rock ranges from 10 to 20 inches.

Permeability of the Ulida soil is moderately slow. Available water capacity is about 1 to 3 inches. Effective rooting depth is 10 to 14 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used mainly for watershed and wildlife. It is also used for recreation and livestock grazing. Steepness of slope limit this unit for most other uses.

This map unit is poorly suited to recreational development. It is limited mainly by slopes. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on this unit is mainly desert buckwheat, mormon tea, atriplex, scattered joshua trees and pinyon pines; and a few perennial grasses, such as desert needlegrass and basin wild rye. The production of vegetation suitable for livestock grazing is limited by low effective precipitation and shallow soils. Slope limits access by livestock and results in overgrazing of the less sloping areas. Some of the inclusions, such as Panamint and Huntmount, produce more forage than the major components. Grazing of this unit could cause over grazing of the more prefered species in these small included areas.

If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases. Therefore, livestock grazing should be managed so that the desired balance of species is maintained in the plant community.

The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are shallow soils and low effective precipitation.

<u>120 Osobb Variant extremely gravelly very fine sandy loam, 2 to 5 percent slopes</u>. This shallow, well drained soil is on pediments, in intermountain basins, and on old alluvial fans. It formed in alluvium derived dominantly from igneous rocks. Slopes are planar to slightly concave. The native vegetation is mainly desert scrub. Elevation is 4,200 to 6,100 feet. The average annual precipitation is about 6 to 8 inches, the average annual air temperature is 53 to 55 degrees F., and the average frost-free season is 185 to 235 days.

Typically, the surface is covered with 85 to 90 percent gravel. The surface layer is light gray and white extremely gravelly very fine sandy loam about 12 inches thick. The next layer is a lime-silica cemented, opalized duripan about 4 inches thick. The underlying material to a depth of 50 inches is white very gravelly fine sandy loam.

Included in this unit are small areas of riverwash, Yellowrock, Blacktop, and Bluewing soils. Included areas make up about 5 percent of the total acreage.

Permeability of this Osobb Variant soil is moderate to a depth of 12 inches and very slow below this depth. Available water capacity is about .3 to 1.5 inches. Effective rooting depth is 10 to 20 inches.

Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight if surface mosaic is undisturbed and severe if disturbed.

This unit is used for wildlife. Poor accessability limits this unit for other uses.

The present vegetation in most areas is mainly shadscale, spiny hopsage, winterfat, indian ricegrass, and galleta.

121 Playas. This map unit is on lowlands; in undrained flats of closed basins. Slope is 0 to 2 percent. Slopes are planar to slightly concave. Areas are generally oval in shape and are 2 to 20 acres in size. Perennial vegetation is generally lacking. Elevation is 2,000 to 6,000 feet. The average annual precipitation is about 4 to 8 inches, the average annual air temperature is 53 to 65 degrees F., and the average frost-free season is 185 to 300 days.

Playas consists of very stratified lacustrine sediments that contain enough salts to prevent the growth of most plants. In dry, calm weather the surface is overlain by a one to four inch mantle of fine sand. In moist, windy weather the wind removes the surface sand mantle exposing a silty surface that is very highly erosive when dry.

Included in this unit are small areas of dune land at the windward margins of each playa and riverwash where the watershed's drainages enter the basins.

The properties of playas are extremely variable due to the textural variation in sediments. Generally, however, playas have a severe hazard for wind erosion; especialy when disturbed by vehicular traffic. In some places water may be ponded for short periods during and after high intensity storms.

This unit has severe limitations for all uses.

122 Riverwash - Arizo association,0 to 5 percent slopes. This map unit is on valley floors and on alluvial fan-terraces adjacent to major stream courses. Slope is 0 to 5 percent. Slopes are generally characterized by broad flats laced by braided stream courses (Plate 16). Areas are long and narrow in shape and are 50 to 500 acres in size. The native vegetation is mainly creosote bush scrub. Elevation is 1,200 to 4,200 feet. The average annual precipitation is about 4 to 6 inches, the average annual air temperature is 60 to 65 degrees F., and the average frost-free season is 235 to 300 days.

This unit is 60 percent riverwash and 35 percent Arizo very stony loamy fine sand. Riverwash is in the active stream channels that incise the fans and flats and Arizo soils are on the interfluve fan-terraces adjacent to the active drainages and have creosote bush vegetation.

Included in this unit are 5 percent Yellowrock soils on adjacent alluvial fans and 5 percent very steep escarpments of gravelly alluvium that make up the incised streambank. Also included are small areas of Yermo soils on slightly older, highly dissected interfluve remnants.

Plate 16. Topographic character and vegetation associated with the 122 unit.

Riverwash is very deep and somewhat excessively drained. It consists of sandy, gravelly, and cobbly alluvium that is constantly being reworked by stream action.

The properties of riverwash are variable due to local variations in sediment particle size distribution. Riverwash is subject to frequent periods of flooding during winter months and high intensity storms.

The Arizo soil is very deep and somewhat excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 50 to 60 percent gravel, cobbles, and stones arranged in a loose mosaic. The surface layer is light yellowish gray very stony loamy fine sand about 3 inches thick. The substratum to a depth of 60 inches or more is grayish brown very gravelly sand with lenses of sand and gravelly loamy sand.

Permeability of the Arizo soil is rapid. Available water capacity is about 2 to 3 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

This unit is used mainly for wildlife habitat. It is also used for recreation. This unit can be used for marginal livestock grazing if a suitable source of water is available.

This map unit is poorly suited to recreational development. It is limited mainly by flood hazard, the highly dissected character of the topography, and surface stones. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic. Protection from flood is needed.

The potential plant community on the Arizo soil is mainly creosote bush, bursage, indian ricegrass, galleta, and other perennial shrubs and grasses. The production of vegetation suitable for livestock grazing is limited by low precipitation and coarse soil textures. The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are arid climate and coarse soil textures.

123 Rock outcrop. This map unit is on hills and mountains. Slope is 9 to 85 percent. Vegetation is essentially lacking except for a few annual forbs and grasses growing in cracks and pockets of soil in the rock (Plate 17). Elevation is 2,000 to 11,000 feet. The average annual precipitation is about 4 to 10 inches, the average annual air temperature is 45 to 65 degrees F., and the average frost-free season is 100 to 300 days.

Plate 17. Rock outcrop consists of limestone or granitic rock exposures supporting no vegetation.

Rock outcrop consists of exposures of soft and hard igneous and sedimentary bedrock.

Rock outcrop has few interpretable properties except very rapid runoff. Rock slides are common.

Included in this unit are small areas of rubble land, consisting of piles of boulders and stones 3 to 10 feet deep; occurring at the bases of large outcroppings of rock, Torriorthents on toe slopes and colluvial areas, badland on very steep, highly dissected weathered rock escarpments, Beveridge, Ferroburro, Mexispring, and Theriot soils under the sparce vegetation in pockets of rock and protected areas directly upslope of the rock outcrops. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another, ranging from as little as 5 percent to as much as 20 percent.

This unit is used for watershed and wildlife.

<u>124 Rock outcrop-Cryoborolls-Xeric Torriorthents association, 30 to 75 percent slopes</u>. This map unit is on high mountain ridges and convex to concave side slopes (Plate 18). The native vegetation is mainly shrubs and conifers. Elevation is 8,000 to 11,000 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 40 to 45 degrees F., and the average frost-free season is 100 to 185 days.

Plate 18. Vegetation associated with the 124 unit.

This unit is 40 percent rock outcrop, 25 percent Cryoborolls and 20 percent Xeric Torriorthents. Rock outcrop is on sharp ridgetops and very steep side slopes, Cryoborolls are on north facing slopes and in protected swales, with slopes of 30 to 50 percent, and Xeric Torriorthents are on south facing slopes and ridgetops with slopes of 30 to 75 percent.

Included in this unit are small areas of Beveridge soils on contacts with calcareous sedimentary rocks, Ulida and Huntmount soils in nearly level to sloping, stable swales between rock outcrops and ridges of rock, and very deep colluvial soils at bases of steep slopes in canyons. Included areas make up about 15 percent of the total acreage.

Rock outcrop consists of exposures of hard and weathered granitic rock and includes rubble land, piles of boulders from 3 to 10 feet deep over shallow soil.

The Cryoborolls are shallow to moderately deep and well drained. They formed in residuum derived dominantly from granitic rocks. Typically, the surface layer is brown gravelly loamy coarse sand about 23 inches thick. The upper 2 inches of the substratum is light yellowish brown gravelly coarse sandy loam, The lower part to a depth of 30 or more inches is weathered guartz monzonite. Depth to acid igneous rock ranges from 10 to 40 inches.

Permeability of the Cryoborolls is moderately rapid. Available water capacity is about 1 to 4 inches. Effective rooting depth is 10 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Xeric Torriorthents are shallow to moderately deep and well drained. They formed in residuum derived dominantly from granitic rocks. Typically, the surface is covered with 5 to 15 percent gravel. The surface layer is pale brown gravelly sandy loam about 6 inches thick. The substratum is light yellowish brown extremely cobbly sandy loam about 19 inches thick over weathered quartz monzonite. Depth to acid igneous rock ranges from 4 to 40 inches.

Permeability of the Xeric Torriorthents is moderately rapid. Available water capacity is about 1 to 2.5 inches. Effective rooting depth is 4 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for watershed and wildlife habitat. Steepness of slope and poor accessability limit this unit for most uses.

The present vegetation on north slopes is mainly limber pine, pinyon pine, Utah juniper, big sagebrush, low sage, curl leaf. If the range vegetation on these slopes is in good or excellent condition, the native grasses are mainly spike fescue, junegrass, squirreltail, needlegrass, and indian ricegrass. The present vegetation on south slopes is mainly single-needle pinyon, Utah juniper, and big sagebrush.

125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes. This map unit is on hills and mountains. The native vegetation is mainly conifers, sagebrush, and desert shrubs (Plate 19). Elevations is 5,000 to 8,000 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 50 to 53 degrees F., and the average frost-free season is 185 to 235 days.

Plate 19. Topographic character and associated vegetation of the 125 unit.

This unit is 35 percent rock outcrop, 25 percent Ulida bouldery loamy coarse sand on 15 to 30 percent slopes, and 20 percent Ferroburro cobbly sandy loam on 15 to 75 percent slopes. Also in this unit is about 10 percent rubble land, consisting of piles of granitic boulders from 3 to 10 feet deep over shallow soil. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Mexispring soils on ridges and south facing slopes and Panamint soils on steep, north facing slopes. Included areas make up about 10 percent of the total acreage.

Rock outcrop consists of exposures of hard and weathered granitic rock.

The Ulida soil is shallow and well drained. It formed in residuum derived dominantly from granitic rocks. Typically, the surface is covered with 2 to 3 percent boulders and stones. The surface layer is dark grayish brown bouldery loamy coarse sand about 6 inches thick. The subsoil is brownish yellow gravelly sandy clay loam about 8 inches thick. The substratum is yellow gravelly sandy loam about 4 inches thick over weathered quartz monzonite. Depth to weathered quartz monzonite ranges from 10 to 20 inches.

Permeability of the Ulida soil is rapid to a depth of 6 inches and slow below this depth. Available water capacity is about 1 to 3 inches. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Ferroburro soil is shallow and well drained. It formed in residuum derived dominantly from granitic rocks. Typically, the surface is covered with .1 to 1 percent boulders and stones. The surface layer is brown cobbly sandy loam about 6 inches thick. The substratum is light yellowish brown gravelly sandy loam about 8 inches thick over weathered quartz monzonite. Depth to weathered granitic rock ranges from 10 to 20 inches.

Permeability of the Ferroburro soil is moderately rapid to a depth of 14 inches and very slow below this depth. Available water capacity is about 1.5 to 2.5 inches. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used mainly for watershed and wildlife habitat. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available.

This map unit is poorly suited to recreational development. It is limited mainly by steepness of slope and rock fragments. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on this unit is mainly pinyon pine, Utah juniper, big sagebrush, needlegrass, and other perennial grasses. If the range vegetation on this unit is in good or excellent condition, the native grasses are mainly needlegrass, needle-and-thread, pine bluegrass, and great basin wild rye. The production of vegetation suitable for livestock grazing is limited by shallow soils and low effective precipitation. If the range is overgrazed, the proportion of

preferred forage plants decreases and the proprotion of less preferred forage plants increases. Therefore, livestock grazing should be managed so that the desired balance of species is maintained in the plant community.

The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are rock outcrops, low effective precipitation, and slope.

Slope limits access by livestock and results in overgrazing of the less sloping areas. Livestock grazing should be managed to protect the unit from excessive erosion.

126 Salt flats. This map unit is on lowlands in undrained flats of closed basins. Slope is 0 to 2 percent. Slopes are planar or slightly concave. Vegetation is lacking in most areas of this unit. Elevation is 1,050 to 1,200 feet. The average annual precipitation is about 4 to 5 inches, the average annual air temperature is 70 to 72 degrees F., and the average frost-free season is 300 to 320 days.

Salt flats consist of very stratified lacustrine sediments, overlain by a 3 to 10 inch crust of crystalline salt (Plate 20), which limits the growth of most plants.

Properties of salt flats are extremely variable due to the varying nature of the sediment particle sizes. Water is ponded during the winter months and the water table is usually within 10 inches of the surface during spring, summer, and fall.

Included in this unit are small areas of playas, dune land, Bunkerhill, Yellowrock, and Yellowrock Variant. Included areas make up about 5 percent of the total acreage.

This unit has few uses, mainly limited to salt and brine extraction and uses by wildlife as a salt source. This unit is highly unsuited for vehicular traffic due to the water saturated conditions during most of the year. It is unsuitable and dangerous for use by hikers. Although the salt crust may appear hard and dry, pedestrians may break through the crust.

127 Theriot extremely gravelly loam, 5 to 30 percent slopes. This shallow and well drained soil is on gently rounded mountain and hill tops or narrow ridges. It formed in residuum derived dominantly from carbonate sedimentary rocks. Slopes are very uneven, and undulating, consisting of many low knolls. The native vegetation is mainly desert scrub. Elevation is 4,000 to 8,000 feet. The average annual precipitation is about 6 to 10 inches, the average annual air temperature is 53 to 55 degrees F, and the average frost-free season is 185 to 235 days.

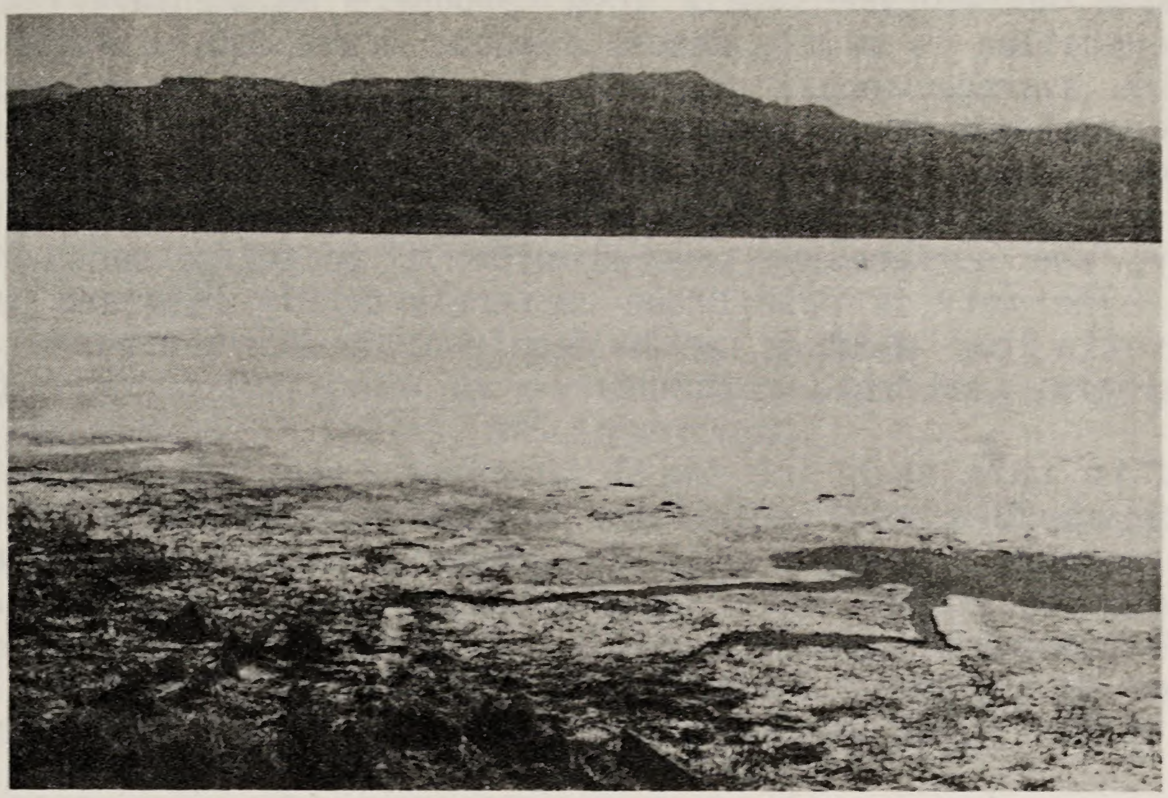


Plate 20. The salt flats in Saline Valley are 98.52 percent pure sodium chloride (table salt).

Typically, the surface is covered with 70 to 80 percent gravel and cobbles. The soil is pale brown extremely gravelly loam about 10 inches deep over fractured, hard limestone. Depth to hard carbonate sedimentary rock ranges from 10 to 20 inches.

Included in this unit are small areas of rock outcrop, soils that are 20 to 40 inches to hard rock, and very deep colluvial soils in swales and at the bases of adjacent steeper areas uphill from delineations of this unit. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Theriot soil is moderate. Available water capacity is about 2 inches. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for watershed and wildlife habitat. Poor accessability limits this unit for all other uses.

The present vegetation in most areas is mainly sparse shadscale, big sagebrush, black sagebrush, a few perennial grasses, and widely scattered pinyon pine and Utah juniper growing primarily in inclusions of deeper soils. If the range vegetation on this unit is in good or excellent condition, the native grasses are mainly galleta and bentgrass. The production of vegetation suitable for livestock grazing is limited by shallow soils and low available water capacity.

128 Theriot extremely cobbly loam, 30 to 75 percent slopes. This shallow, well drained soil is on steep hills and mountains. It formed in residuum derived dominantly from carbonate sedimentary rocks. The native vegetation is mainly desert scrub. Elevation is 4,000 to 8,000 feet. The average annual precipitation is about 6 to 10 inches, the average annual air temperature is 53 to 55 degrees F., and the average frost-free season is 185 to 235 days.

Typically, the surface is covered with 70 to 90 percent gravel and cobbles. The soil is pale brown extremely cobbly loam and pale brown very gravelly loam about 6 inches deep over fractured, hard limestone. Depth to hard, carbonate sedimentary rock ranges from 5 to 20 inches.

Included in this unit are small areas of rock outcrop; soils with hard rock at 20 to 40 inches on inclusions of lesser sloping areas; cobbly, gravelly and stony colluvial soils at the bases of steep mountain sides, toe slopes, and land slide areas; and moderately deep soils with numerous rock fragments within the profile, on north slopes; at elevations of 7,500 to 8,000 feet. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Theriot soil is moderate. Available water capacity is about .5 to 1.5 inches. Effective rooting depth is 5 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of soil blowing is severe.

This unit is used for watershed and wildlife. Poor accessibility and steep slopes limit this unit for other uses.

The present vegetation in most areas is mainly shadscale widely scattered perennial grasses and forbs, and very widly scattered black sagebrush, pinyon pine, Utah juniper, and big sagebrush growing in inclusions of deeper soils. If the range vegetation on this unit is in good or excellent condition, the native grasses are mainly galleta, three awn, and indian ricegrass. The production of vegetation suitable for livestock grazing is limited by shallow soils and low available water capacity.

129 Torriorthents, stony. This map unit is on hill and mountain escarpments bounding arid valleys. Slope is 30 to 100 percent. Slopes are convex, stony, and dissected by many shallow drainage channels. The native vegetation is mainly very sparse desert scrub. Elevation is 1,500 to 4,000 feet. The average annual precipitation is about 4 to 8 inches, the average annual air temperature is 50 to 68 degrees F, and the average frost-free season is 235 to 285 days.

Included in this unit are small areas of rock outcrop, badland, Theriot, and Ferroburro soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Torriorthents consist of very shallow to very deep soils formed in residuum and colluvium from igneous, sedimentary, and metamorphic rocks. Textures range from cobbly or stony loamy sand to cobbly or stony sandy clay loam. Most are calcareous.

Properties of the Torriorthents are extremely variable. Most are susceptible to slope failure. Soil and rock slides are common. Runnoff is generally rapid to very rapid. Erosion hazard is severe. The hazard of soil blowing is moderate to severe.

The unit is generally characterized by shallow soils on ridges, moderately deep to shallow soils on sideslopes, and very deep colluvial soils on toe slopes, in swales, and in canyons.

This unit is used for watershed and wildlife. Steep slopes and erosion hazard limit this unit for all uses.

The present vegetation consists of very widely scattered fourwing saltbush, spiny hopsage, creosote bush, annual forbs, and a few annual grasses.

<u>130 Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slopes.</u> This shallow, somewhat excessively drained soil is on pediments and igneous plateaus. It formed in residuum and from very shallow alluvial veneers derived dominantly from extrusive igneous rocks. The native vegetation is mainly desert shrubs and joshua trees. Elevation is 5,000 to 6,400 feet. The average annual precipitation is about 7 to 9 inches, the average annual air temperature is 53 to 55 degrees F., and the average frost-free season is 185 to 235 days.

Typically, the surface is covered with 25 to 30 percent gravel with a few scattered cobbles and stones. The surface layer is pale brown gravelly very fine sandy loam and light yellowish brown loam about 10 inches thick. The upper 4 inches of the underlying material is very pale brown cobbly very fine sandy loam. The next 11 inches is a white lime-silica cemented duripan. The lower part at a depth of 25 inches is weathered basalt. Depth to an indurated duripan ranges from 14 to 20 inches. The Tybo soils in this survey are a taxadjunct. They lack the subsoil horizon with thin clay films and have bedrock at 25 inches.

Included in this unit are small areas of rock outcrop, riverwash, and Blacktop soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Tybo Variant is moderate to a depth of 14 inches and very slow below this depth. Available water capacity is about 1.5 to 2.5 inches. Effective rooting depth is 14 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for watershed, wildlife habitat, and recreation. This unit can be used for livestock grazing if a suitable source of water is available.

If this unit is used for recreational development, the main limitations are shallow soils, surface rock fragments, and soil blowing. Heavy traffic disturbs the surface rock fragment mosaic and causes accelerated water and wind erosion. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic.

The present vegetation in most areas is mainly big sagebrush, spiny hopsage, joshua trees, scattered galleta, indian ricegrass, and needle-grass. The production of vegetation suitable for livestock grazing is limited by shallow soils and low effective precipitation.

<u>131 Ulida - Mexispring complex, 50 to 85 percent slopes</u>. This map unit is on mountain ridges and side slopes. Slopes are irregular. The native vegetation is mainly pinyon pine, sagebrush, and joshua trees. Elevation is 5,000 to 8,000 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 53 to 55 degrees F., and the average frost-free season is 185 to 235 days.

This unit is 40 percent Ulida bouldery loamy coarse sand on 59 to 55 percent slopes and 40 percent Mexispring very cobbly fine sandy loam on 50 to 85 percent slopes.

Included in this unit are small areas of Badland on the extremely steep, east facing escarpments, Ferroburro Variant and Theriot soils on contacts with limestone, Panamint and Luckyrich soils in swales, Ferroburro soils on a few north facing slopes, outcrops of quartz monzonite on ridges and extremely steep side-slopes, and very deep soils composed of gravelly, cobbly, and stony, coarse textured colluvium occuring on toe slopes and at the bases of very steep mountain slopes. Included areas make up about 20 percent of the total acreage.

The Ulida soil is shallow and well drained. It formed in residuum derived dominantly from granitic rocks. Typically, the surface is covered with .1 to 5 percent boulders and stones. The surface layer is brown bouldery loamy coarse sand and sandy loam about 6 inches thick. The subsoil is reddish yellow sandy clay loam about 9 inches thick. The substratum is yellow gravelly sandy loam about 5 inches thick over weathered quartz monzonite. Depth to weathered granitic rock ranges from 10 to 20 inches.

Permeability of the Ulida soil is moderately slow to very slow. Available water capacity is about 2 inches. Effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Mexispring soil is shallow and somewhat excessively drained. It formed in residuum derived dominantly from granitic rocks. Typically, the surface is covered with 35 to 50 percent gravel, cobbles, and a few stones and boulders. The soil is pale brown very cobbly sandy loam about 10 inches deep over weathered quartz monzonite. Depth to weathered granitic rock ranges from 4 to 14 inches.

Permeability of the Mexispring soil is moderately rapid to a depth of 10 inches and very slow below this depth. Available water capacity is about 1 inch. Effective rooting depth is 4 to 14 inches. Runoff is very rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used mainly for watershed and wildlife. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available and access to the area is provided.

If this unit is used for recreational development, the main limitations are steepness of slope, erosion hazard, and bouldery and cobbly surface soil textures. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on the Ulida soil is mainly big sagebrush, single needle pinyon, Utah juniper, bitterbrush and other shrubs. If the range vegetation on the Ulida soil is in good or excellent condition, the native grasses are mainly basin wild rye. The potential plant community on the Mexispring soil is mainly Mormon tea, joshua trees, big sagebrush, bitterbrush, and California buckwheat. If the range vegetation on the Mexispring soil is in good or excellent condition, the native grasses are mainly desert needlegrass and indian ricegrass. The production of vegetation suitable for livestock grazing is limited by shallow soils. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases. Therefore, livestock grazing should be managed so that the desired balance of species is maintained in the plant community.

The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are shallow soil, low available water capacities, and runoff-erosion hazard.

Slope limits access by livestock and results in overgrazing of the less sloping areas. Mechanical treatment is not practical because the surface is stony and the slopes are steep. Livestock grazing should be managed to protect the unit from excessive erosion. Steepness of slope severely limits the use of this unit for livestock grazing.

132 Upspring - Blacktop association, 15 to 50 percent slopes. This map unit is on block faulted, plateau-form lava flows. Slopes are characterized by even surfaces of tilted blocks bounded by extremely steep escarpments. The native vegetation is mainly sparce desert shrubs and annual forbs. Elevation is 1,600 to 6,500 feet. The average annual precipitation is about 4 to 8 inches, the average annual air temperature is 53 to 63 degrees F., and the average frost-free season is 185 to 300 days.

This unit is 40 percent Upspring very stony loam and 35 percent Blacktop very stony fine sandy loam. Upspring is on the plateau at elevations below 4,000 feet and Blacktop is at elevations above 4,000 feet.

Included in this unit are small areas of rock outcrop on the very steep escarpments, Yellowrock soils in basins, playas in small inter-plateau basins, riverwash in drainage channels, and Theriot soils on limestone exposures. Included areas make up about 20 percent of the total acreage.

The Upspring soil is shallow and somewhat excessively drained. It formed in residuum derived dominantly from extrusive igneous rocks. Typically, the surface is covered with 50 to 65 percent gravel, cobbles, and stones. The surface layer is light gray very stony loam and very stony sandy loam about 6 inches thick. The underlying material to a depth of 8 inches is very pale brown very gravelly sandy loam. Depth to hard extrusive igneous rock ranges from 4 to 14 inches.

Permeability of the Upspring soil is moderately rapid. Available water capacity is about .2 to 1.3 inches. Effective rooting depth is 4 to 14 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Blacktop soil is shallow and somewhat excessively drained. It formed in residuum derived dominantly from extrusive igneous rocks. Typically, the surface is covered with 60 to 70 percent gravel, cobbles, and stones. The surface soil is light gray very stony fine sandy loam about 7 inches deep over hard basalt. Depth to hard extrusive igneous rock ranges from 4 to 10 inches.

Permeability of the Blacktop soil is moderate. Available water capacity is about .2 to 1.4 inches. Effective rooting depth is 4 to 14 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for watershed, wildlife, and recreation.

If this unit is used for recreational development, the main limitations are slope, surface rock fragments, and poor access. Risk of soil blowing increases if surface pavement is disturbed.

The potential plant community on the Upspring soil is mainly desert holly, shadscale, creosote bush, and scattered annuals. The potential plant community on the Blacktop soil is mainly shadscale, winterfat, and scattered perennial grasses. The production of vegetation suitable for livestock grazing is limited by shallow soils and low available water capacity.

133 Waucoba stony loam, 30 to 85 percent slopes. This shallow, well drained soil is on hills and mountains. It formed in residuum derived dominantly from metamorphic rocks. Slopes are smooth and usually convex. The native vegetation is mainly sagebrush and desert shrubs (Plate 21). Elevation is 5,000 to 8,000 feet. The average annual precipitation is about 7 to 9 inches, the average annual air temperature is 50 to 53 degrees F, and the average frost-free season is 185 to 235 days.

Typically, the surface is covered with 25 to 40 percent gravel, cobbles, and stones. The surface layer is pale brown stony loam and gravelly loam about 9 inches thick. The subsoil is light yellowish brown very gravelly clay loam about 10 inches thick. Depth to hard metamorphic rock ranges from 14 to 20 inches.

Included in this unit are small areas of rock outcrop, Waucoba Variant, Greyeagle Variant, Theriot, Ferroburro Variant, and soils similar to Waucoba that have solums thicker than 20 inches. Included areas make up about 10 percent of the total acreage.

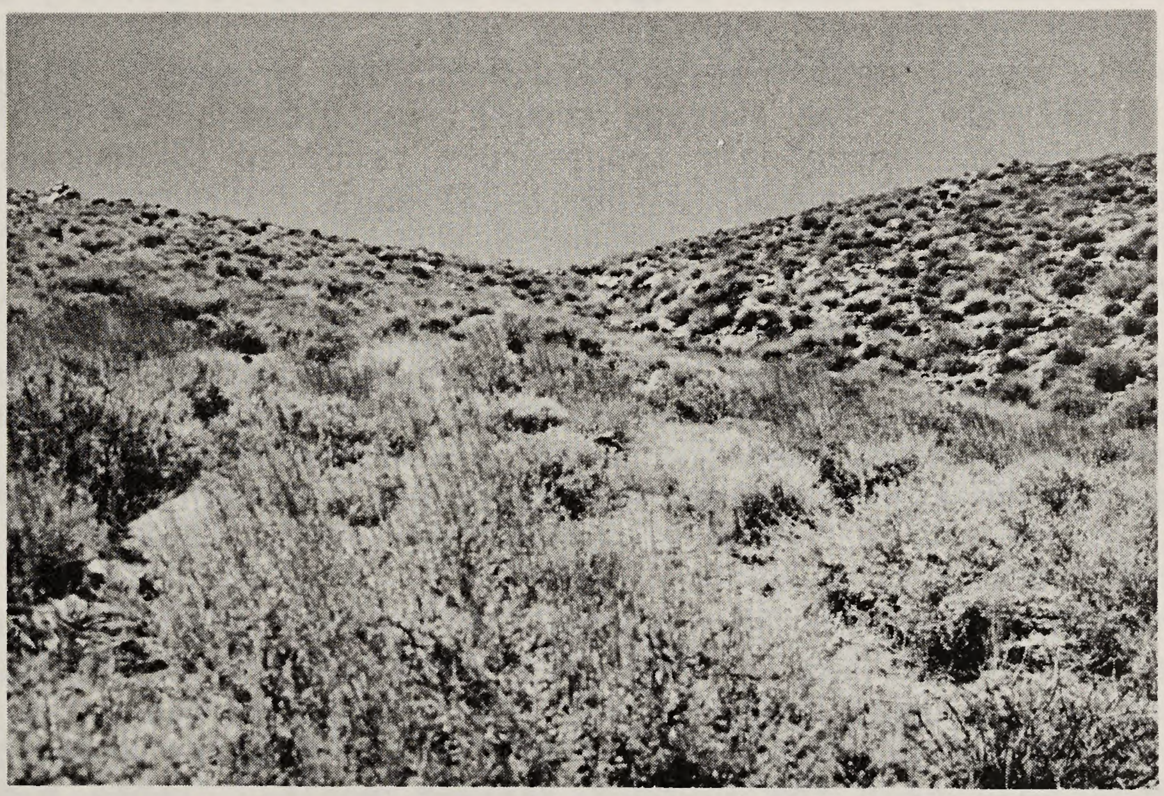


Plate 21. Topographic character and associated vegetation of the 133 unit.

Permeability of this Waucoba soil is moderate to a depth of 9 inches and moderately slow below this depth. Available water capacity is about 1.4 to 3 inches. Effective rooting depth is 14 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used mainly for watershed and wildlife habitat. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available.

If this unit is used for recreational development, the main limitations are slope, surface stones, and depth to rock. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on this unit is mainly big sagebrush, spiny hopsage, shadscale and Mormon tea. If the range vegetation on this unit is in good or excellent condition, the native grasses are mainly indian ricegrass and desert needlegrass. The production of vegetation suitable for livestock grazing is limited by low precipitation and shallow soil.

134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes. This moderately deep, well drained soil is on ridgetops and side slopes. It formed in residuum derived dominantly from metamorphosed sedimentary rocks. Slopes are convex and relatively even with numerous talus slides of cobbles and stones (Plate 22). The native vegetation is mainly desert shrubs and perennial grasses. Elevation is 4,200 to 6,000 feet. The average annual precipitation is about 6 to 8 inches, the average annual air temperature is 53 to 55 degrees F., and the average frost-free season is 185 to 235 days.

Typically, the surface is covered with 80 to 90 percent gravel, stones, and cobbles. The surface layer is pale brown extremely cobbly fine sandy loam about 2 inches thick. The upper 6 inches of the subsoil is pale brown very cobbly loam. The lower 14 inches is pink and pale brown very cobbly sandy loam. Weathered metasedimentary rock is at a depth of 22 inches. Depth to weathered metasedimentary rock ranges from 20 to 40 inches.

Included in this unit are small areas of rock outcrop, Theriot soils, and soils similar to the Waucoba Variant that are shallower than 20 inches. Included areas make up about 10 percent of the total acreage. The unit has numerous talus slides with piles of cobbles and stones from 2 to 5 feet deep over the Waucoba Variant soils. These rubble land areas occupy 10 percent of the surface of this unit.

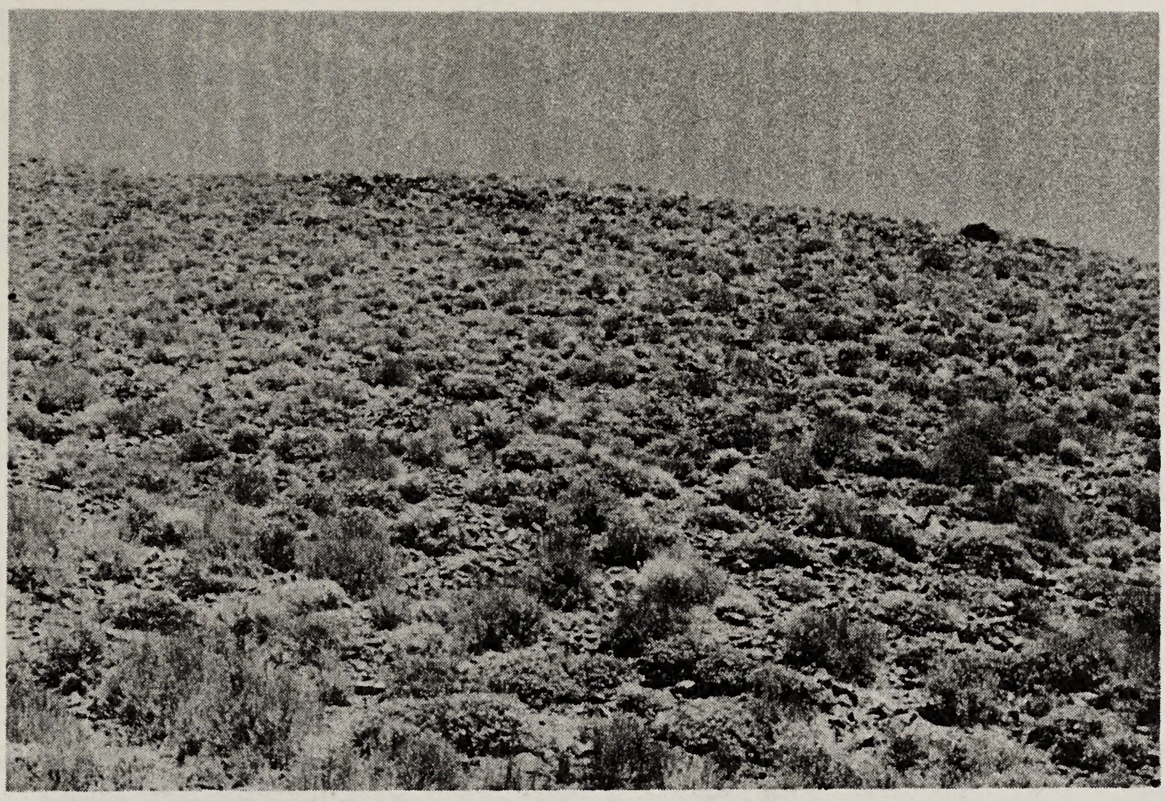


Plate 22. Topographic and surface character of the 134 unit.

Permeability of this Waucoba Variant soil is moderately. Available water capacity is about 1.5 to 4 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for watershed and wildlife habitat. Steepness of slope limits most uses.

The present vegetation in most areas is mainly galleta, needlegrass, squirreltail, blackbrush, spiny hopsage, big sagebrush, bud sagebrush, and other shrubs, grasses, and forbs.

135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes. This very deep, somewhat excessively drained soil is on alluvial fans and flood plains. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Slopes are even, planar to slightly concave (Plate 23). The native vegetation is mainly desert shrubs. Elevation is 1,200 to 2,500 feet. The average annual precipitation is about 4 to 6 inches, the average annual air temperature is 60 to 65 degrees F, and the average frost-free season is 235 to 300 days.

Typically, the surface is covered with 60 to 90 percent pebbles. The surface layer is pale brown very gravelly loamy sand about 3 inches thick. The underlying material to a depth of 60 inches is light brownish gray and pale brown stratified loamy sand to very gravelly loamy sand.

Plate 23. Nearly level surfaces and sparse vegetation characterize the Yellowrock soils in the 135 unit.

Included in this unit are small areas of riverwash in incised drainage channels, Arizo soils on interfluves adjacent to drainages and Bunkerhill and salt flats in poorly drained, low lying basin positions. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Yellowrock soil is rapid. Available water capacity is about 2.5 to 4.8 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to brief periods of flooding in winter months.

This unit is used mainly for wildlife. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available.

If this unit is used for recreational development, the main limitations are sandy textures and flooding. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on this unit is mainly creosote bush, bursage, tidistromis, desert holly, and indian ricegrass. The production of vegetation suitable for livestock grazing is limited by low

precipitation. The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are low precipitation and sandy textures. This unit is limited for livestock watering ponds and other water impoundments because of the seepage potential.

<u>136 Yellowrock loamy fine sand, 2 to 9 percent slopes</u>. This very deep, somewhat excessively drained soil is in intermountain valleys. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Slopes are concave to planar. The native vegetation is mainly sagebrush. Elevation is 4,200 to 5,500 feet. The average annual precipitation is about 6 to 8 inches, the average annual air temperature is 50 to 55 degrees F, and the average frost-free season is 185 to 235 days.

Typically The surface layer is light yellowish brown loamy fine sand about 7 inches thick. The underlying material to a depth of 60 inches is stratified sand and cobbly loamy sand to gravelly loamy sand. Yellowrock soils in this unit are a taxadjunct with mean annual soil temperatures ranging from 53 to 59° F.

Included in this unit are small areas of Bluewing soils on terraces directly adjacent to drainage channels, riverwash in the active channels, Luckyrich at the valley margins, and Luckyrich Variant in low lying areas devoid of the rock fragments. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Yellowrock soil is rapid. Available water capacity is about 4 to 5 inches. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used mainly for wildlife. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available.

The Yellowrock soil is suited to recreational development. It is limited mainly by sandy surface textures and surface rock fragments. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on the soil is mainly big sagebrush, basin wildrye, needlegrass, needle-and-thread, and indian ricegrass. The suitability of this soil for rangeland seeding is fair. The main limitations for seeding are low precipitation and sandy soil textures. The plants selected for seeding should meet the seasonal requirements of livestock or wildlife, or both. This soil is limited for livestock watering ponds and other water impoundments because of the seepage potential.

<u>137 Yellowrock - Bluewing - Arizo association, channeled 5 to 15 percent slopes</u>. This map unit is on aluvial fans and bahadas peripheral to major valleys (Plate 24). Slopes are irregular; characterized by convex interfluves incised by recent stream channels. Areas are long and moderately wide in shape and are 100 to 1,000 acres in size. The native vegetation is mainly sagebrush and desert shrubs at elevations from 4,200 to 5,500 feet and creosotebush scrub at elevation's from 1,200 to 4,200 feet. Elevation is 1,200 to 5,500 feet. The average annual precipitation is about 4 to 8 inches, the average annual air temperature is 52 to 65 degrees F., and the average frost-free season is 185 to 300 days.

This unit is 35 percent Yellowrock very gravelly loamy sand, 30 percent Bluewing very gravelly loamy sand, and 25 percent Arizo very gravelly loamy sand. Yellowrock is on fans and interfluves at elevations from 1,200 to 4,200 feetet, Bluewing is on fans, interfluves, and older drainage channels at elevations from 4,200 to 5,500 feet, and Arizo is in recent drainage channels and interfluves at elevations from 1,200 to 4,200 feet.

Plate 24. Occasionally the boundary between two map units is very sharp as between the 108 unit on the right and the 137 unit of the left.

Included in this unit are small areas of riverwash in the active, incised drainage channels. Included areas make up about 10 percent of the total acreage.

The Yellowrock soil is very deep and somewhat excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 60 to 70 percent gravel. The surface layer is pale brown very gravelly loamy sand about 4 inches thick. The underlying material to a depth of 60 inches is light brownish gray stratified gravelly loamy sand to very gravelly sand.

Permeability of the Yellowrock soil is rapid. Available water capacity is about 3 to 5 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to very brief periods of flooding in winter months and during high intensity storms.

The Bluewing soil is very deep and excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 35 to 60 percent gravel and cobbles. The surface layer is pale brown very gravelly loamy sand about 10 inches thick. The underlying material to a depth of 60 inches is light gray cobbly and very cobbly loamy sand.

Permeability of the Bluewing soil is very rapid. Available water capacity is about 2 to 3 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Arizo soil is very deep and somewhat excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 60 to 70 percent gravel and cobbles. The surface layer is light brownish gray very gravelly loamy sand about 4 inches thick. The underlying material to a depth of 60 inches is grayish brown very gravelly and very cobbly sand.

Permeability of the Arizo soil is rapid. Available water capacity is about 1 to 3 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to frequent periods of flooding in winter months.

This unit is used mainly for wildlife habitat. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available.

If this unit is used for recreational development, the main limitations are complex topographic character, sandy soil textures, and surface rock fragments. Some areas have an extreme hazard for flash floods

during rain storms. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on the Yellowrock and Arizo soils is mainly creosote bush, bursage, desert holly, and indian ricegrass. The potential plant community on the Bluewing soil is mainly big sagebrush, indian ricegrass, galleta, squirreltail, bud sagebrush, shadscale, and other shrubs. The production of vegetation suitable for livestock grazing is limited by low precipitation and sandy soil textures. The suitability of this unit for rangeland seeding is very poor and seeding is not recommended. The main limitations for seeding are low precipitation and low available water capacity.

<u>138 Yellowrock - Riverwash complex, 2 to 5 percent slopes</u>. This map unit is on alluvial fans and bahadas that are highly incised by braided drainage channels. Slopes are highly complex; characterized by nearly level interfluves with gently sloping side slopes between active drainage channels. Areas are long and irregular in shape and are 200 to 300 acres in size. The native vegetation is mainly creosote bush scrub. Elevation is 1,200 to 2,500 feet. The average annual precipitation is about 4 to 6 inches, the average annual air temperature is 60 to 65 degrees F., and the average frost-free season is 285 to 300 days.

This unit is 60 percent Yellowrock very bouldery loamy sand and 25 percent riverwash. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 15 percent Arizo soils in somewhat stabilized, older drainage channels and on the adjacent interfluves.

The Yellowrock soil is very deep and somewhat excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 60 to 80 percent gravel, cobbles, stones, and boulders. The surface is pale brown very bouldery loamy sand about 8 inches thick. The underlying material to a depth of 60 inches is light brownish gray loamy sand.

Permeability of the Yellowrock soil is rapid. Available water capacity is about 3 to 5 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to very brief periods of flooding in winter months.

Riverwash consists of sediments in active drainage channels that are constantly being reworked by ephemeral stream action. Textures vary from sand to very bouldery sandy loam. Perennial vegetation is lacking.

Properties are varied. Riverwash is subject to frequent periods of flooding during winter months and high intensity storms.

This unit is used mainly for wildlife. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available.

If this unit is used for recreational development, the main limitations are surface rock fragments, sandy textures, and complex topographic character. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on the Yellowrock soil is mainly creosote bush, bursage, indian ricegrass, tidistromis, and desert holly. The production of vegetation suitable for livestock grazing is limited by low precipitation and sandy soil textures. The suitability of this unit for rangeland seeding is very poor and seeding is not recommended. The main limitations for seeding are low precipitation and low available water capacity of the Yellowrock soil.

<u>139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes</u> This map unit is on alluvial fans and bahadas peripheral to major valleys. Slopes are irregular with convex interfluves incised by drainage channels. The native vegetation is mainly desert shrubs, creosote bush scrub. Elevation is 1,200 to 4,200 feet. The average annual precipitation is about 4 to 6 inches, the average annual air temperature is 60 to 65 degrees F., and the average frost-free season is 235 to 300 days.

This unit is 35 percent Yellowrock very gravelly loamy sand, 30 percent Yermo very gravelly loam, and 25 percent percent Arizo very gravelly loamy sand. Yermo is on higher, older, stabilized interfluves paved by desert varnish coated rock fragments, Yellowrock is on younger alluvial fans and interfluves, and Arizo is in recent, slightly stabilized drainage channels. Yermo soils in this unit at elevations of 1,200 to 2,500 feet are taxadjuncts with a mean annual soil temperature ranging between 65 and 69°F. which is outside of the range for the official Yermo series. Included in this unit is about 10 percent riverwash in active drainage channels.

The Yellowrock soil is very deep and somewhat excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 60 to 70 percent gravel and cobbles. The surface layer is pale brown very gravelly loamy sand about 4 inches thick. The underlying material to a depth of 60 inches is light brownish gray and pale brown stratified loamy sand to very gravelly loamy sand.

Permeability of the Yellowrock soil is rapid. Available water capacity is about 3 to 5 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Yermo soil is very deep and well drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 60 to 70 percent desert varnished gravel and cobbles. The surface layer is light brownish gray very gravelly loam about 3 inches thick. The underlying material to a depth of 60 inches is very pale brown very gravelly loam.

Permeability of the Yermo soil is moderately rapid. Available water capacity is about 4 to 7 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Arizo soil is very deep and somewhat excessively drained. It formed in alluvium derived dominantly from igneous and sedimentary rocks. Typically, the surface is covered with 60 to 70 percent gravel and cobbles. The surface layer is light brownish gray very gravelly loamy sand about 4 inches thick. The underlying material to a depth of 60 inches is grayish brown very gravelly sand.

Permeability of the Arizo soil is rapid. Available water capacity is about 1 to 3 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to brief periods of flooding in winter months and during high intensity storms.

This unit is used mainly for wildlife. It is also used for recreation. This unit can be used for livestock grazing if a suitable source of water is available.

If this unit is used for recreational development, the main limitations are surface rock fragments, sandy textures of the Yellowrock and Arizo soils, complex topographic character, and flash flood hazard. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on the Yellowrock and Arizo soils is mainly creosote bush, desert holly, bursage, indian ricegrass, and tidistromis. The potential plant community on the Yermo soil is mainly creosote bush, burrobush, four-wing saltbush, Fremont dalea, desert aster, and desert needlegrass. The production of vegetation suitable for livestock grazing is limited by low precipitation and sandy textures for the Yellowrock and Arizo soils. The suitability of this unit for rangeland seeding is very poor and seeding is not recommended. The main limitations for seeding are low precipitation and low available water capacity in the Arizo soils.

140 Yellowrock Variant loam, 0 to 2 percent slopes. This very deep, somewhat poorly drained soil is in the basin and on the basin rim. It formed in lacustrine alluvium derived dominantly from igneous and sedimentary rocks. Slopes are planar. The native vegetation is mainly alkali sink scrub (Plate 25). Elevation is 1,050 to 1,250 feet. The average annual precipitation is about 4 to 5 inches, the average annual air temperature is 70 to 72 degrees F., and the average frost-free season is 300 to 320 days.

Typically the surface has a 1/2 inch brittle, saline crust. The surface layer is grayish brown loam about 8 inches thick. The substratum to a depth of 18 inches or more is light brownish gray stratified gravelly fine sandy loam to silt loam. Below this is a buried surface layer of brown silt loam about 6 inches thick. The upper 7 inches of the underlying material is light brownish gray silt loam. The next 12 inches is light brownish gray fine sandy loam. The lower part to a depth of 60 inches is light brownish gray very gravelly sandy loam.

Included in this unit are small areas of salt flats, dune land, Bunkerhill loamy fine sand, and Yellowrock gravelly loamy sand. Included areas make up about 15 percent of the total acreage.

Plate 25. Halophytic vegetation thrives in the Yellowrock Variant soils of the 140 unit.

Permeability of this Yellowrock Variant soil is moderate. Available water capacity is about 0 to 4.5 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil is subject to occasional periods of flooding in winter months and during high intensity storms.

This unit is used mainly for wildlife. It is also used for recreation.

If this unit is used for recreational development, the main limitations are flooding hazard and dusty surface conditions when surface crust is disturbed. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic.

The potential plant community on this unit is mainly alkali sacaton, saltgrass, arrow weed, parry saltbush, mesquite, and alkali blight.

Use and Management of the Soils

The soil survey is an inventory and evaluation of the most basic resource of the survey area--the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, range plant yield estimates, flooding, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for rangeland, woodland, and as sites for buildings, highways and other transportation systems, sanitary facilities, campgrounds and other recreation facilities, and wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the

environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Native vegetation, campsites and playgrounds are influenced by the nature of the soil.

Rangeland

Only about 10 percent of the area is used for livestock grazing, principally cattle (Plate 26). This area is located in the southernmost portion of the area, Hunter Mountain. The dominant kind of livestock operation is the cow-calf-steer type. The Hunter grazing allotment extends south into the Darwin area.

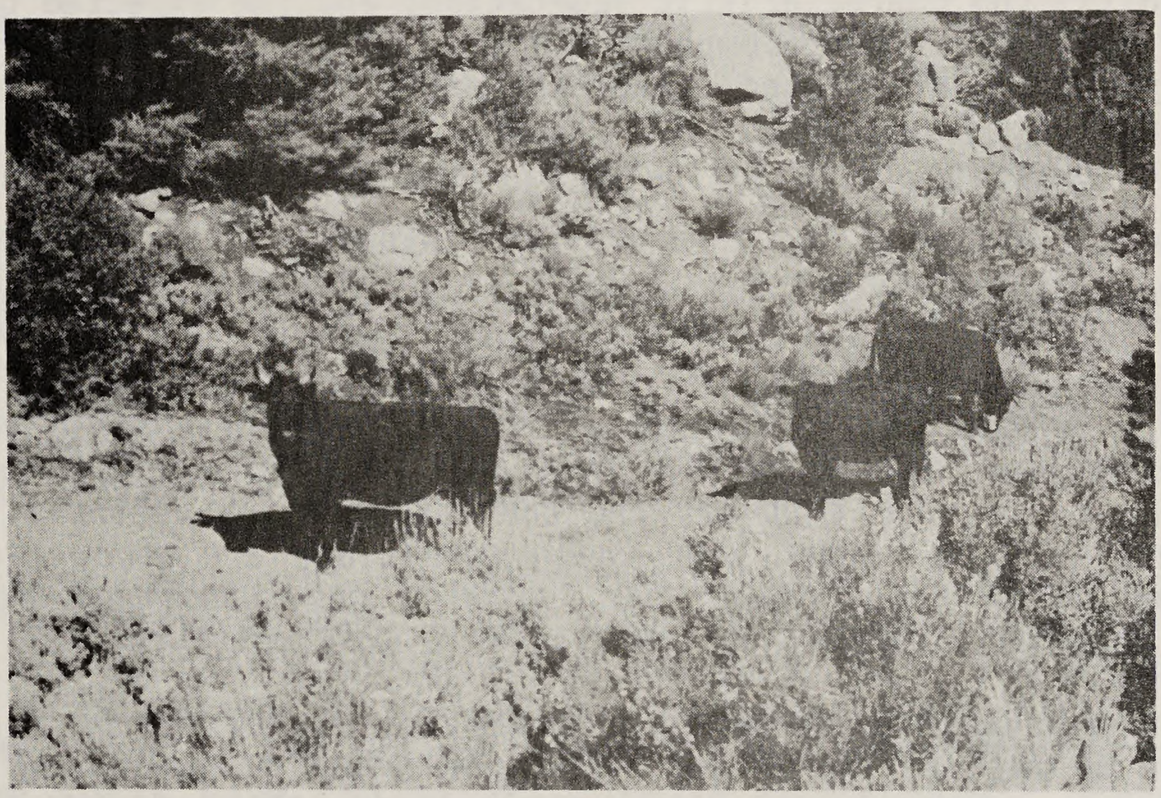


Plate 26. Cattle grazing on the Huntmount - Ferroburro - Rock outcrop association.

Soils strongly influence the native vegetation. In the area of Spanish Spring, the soils are very deep and moderately coarse textured. These soils support scattered, medium height bunch grasses and a few palatable browse shrub species. Much of that area produces rabbit brush which is not used as browse by cattle. Adjacent areas have soils that are shallow to bedrock. Those soils support few low grasses and low browse shrub species. Production on these shallow sites is low due to the low available water capacity.

Much of the area in the Hunter grazing allotment consists of moderately deep soils producing medium height shrub browse species and scattered concentrations of palatable medium height grasses. Current production of grazable species is highest on these soils, however, production can be increased on the deeper alluvial soils, such as Luckyrich Variant, by management and removal of the unpalalable rabbit brush and planting grazable species.

Where climate and topography are about the same, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table C shows, for some of the soils, the total annual production of vegetation in favorable, normal, and unfavorable years; for all of the soils, the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community of predominately grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in Table C.

Total production refers to the amount of vegetation that can be expected to grow annually on well-managed rangeland that is supporting the potential natural plant community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the amount and distribution of precipitation and the temperatures are such that growing conditions are substantially better than average; in a normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Characteristic species of grasses, grasslike plants, forbs, and shrubs that make up most of the potential natural plant community on each soil are listed by common name. Under composition, the expected proportion of each species is presented as the percentage, in air-dry weight, of the total annual production of herbaceous and woody plants. Because only major species are listed, percentages do not necessarily total 100. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally all of the vegetation produced is not used.

Range management requires, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat and protects soil and water resources.

The major management concern on most rangeland is control of grazing so that the kinds and amounts of plants that make up the potential natural plant community are reestablished. In some areas production is approximately half of that originally produced because the natural vegetation in those parts of the survey area has been greatly depleted by continued excessive use.

Manipulating or reducing undesirable brush species and minimizing soil blowing are important management concerns. Sound range management based on soil survey information and other rangeland inventory information is the basis for maintaining or improving forage production.

Plant Communities

The Saline Valley area contains four major plant communities, representatives of two of the California floristic provinces as delineated on the "General Plant Community Map" (9, Barbour and Major). The plant communities observed are in the classes of the "Sagebrush Steppe" and "Transmontane Coniferous Vegetation" of the "Great Basin Floristic Province" and the "Mojave Desert Scrub Vegetation" and "Sonoran Desert Vegetation" of the "Hot Desert Floristic Province".

Sonoran Desert Vegetation: In Saline Valley there are a few vegetative types representative of Sonoran Desert Vegetation. Although the area is not included in that physiographic province, soil and elevational characteristcis representative of the Sonoran Desert can be found. These areas occur in the valley basin at elevations of 1,050 to 1,200 feet. The soils have characteristically hyperthermic temperature regimes, with small inclusions of soils with a thermic temperature regime on a rim area. The Bunkerhill, Yellowrock Variant, salt flats, and dune land are the major soils and miscellaneous areas that are in this elevational zone. The Yellowrock series occurs on the rim and has vegetation that falls into this cateagory grading into the "Mojave Desert Scrub" communities.

Potential plant communities in this area do not conform completely to those of the true "Sonoran Desert" community, but have many of the representative species.

The lowest portion of the zone contains the salt flats and the Bunkerhill soils. These have vegetative and climatic characteristics typical of the alkali-sink vegetative type (Plate 27). Species represented in the Saline Valley area include pickle weed (Allenrolfea occidentalis) and Mojave seablight (Sueda torreyana). Saltbushes and mesquites are a very minor part of the plant community.

Plate 27. The vegetation in the Bunkerhill soils represents the Alkali-sink vegetation type.

The Yellowrock Variant soils have habitats which are transitional between the alkali-sink and saltbush scrub types. Vegetation characteristic of these soils include mostly screwbean mesquite (Prosopis pubescens), honey mesquite (Prosopis glandulosa), and arrow weed (Pluchea sericea), grading into the desert salt bush (Atriplex polycarpa) type.

The areas of dune land and Yellowrock soils marginal to the basin have a habitat characteristic of the creosote bush scrub vegetative type. Coarse textured soils and low to moderate ammounts of salt produce vegetation that is fairly characteristic of the creosote bush (Larrea tridentata) - White bursage (Ambrosia dumosa)type. The areas with this vegetative type occur at an elevation of about 1,200 feet. The Yellowrock soils and dune land are so disturbed that many of the representatives of the potential plant community are absent. These areas are the least representative of the types characteristic of the "Sonoran Desert".

Mojave Desert Scrub: As elevations increase, vegetative types become more characteristic of the "Mojave Desert Scrub" communities.

The areas lowest in elevation, 1,200 to 2,000 feet, include the gently sloping alluvial fans and washes of the Yellowrock and Arizo series. The vegetation growing in these soils is characteristic of the creosote bush scrub type (Plate 28). The dominant plant is definitely creosote bush (Larrea tridentata), but the type contains minor ammounts of other species including white bursage (Ambrosia dumosa), Mormon tea (Ephedra nevadensis), desert needlegrass (Stipa speciosa), beavertail cactus (Opunta ssp.), and indian ricegrass (Oryzopsis hymenoides). These areas rapidly grade into the salt bush scrub type at about 2,000 feet elevation.

Plate 28. The vegetation on the Yermo soils characterizes the creosote scrub type.

The lower elevational zones of the Arizo Variant, Greyeagle, Greyeagle Variant, Upspring and Yermo soils and the upper elevational zones of the Arizo and Yellowrock soils have plant communities representative of the salt bush scrub type (Plate 29). This vegetative type occurs at elevations between 1,600 and 3,000 feet on alluvial fans and terraces with coarse to moderately coarse soils containing a high percentage of rock fragments and carbonates, medium textured, shallow soils, and on areas of soils formed in residuum that are shallow to rock.

The Saline Valley contains representative of the Xerophytic phase of this type growing in dry, somewhat droughty, mildly to moderately salty soils. The important species in this group include desert saltbush (Atriplex polycarpa), fourwing saltbush (Atriplex canescens), desert holly (Atriplex hymenlytra), and shadscale (Atriplex confertifolia). Other species include scattered creosote bush (Larrea tridentata), spiny horsebush (Tetradymia spinescence), Mormon tea (Ephedra nevadensis), white bursage (Ambrosia dumosa), spiny hopsage (Grayia spinosa), desert needlegrass (Stipa speciosa), indian ricegrass (Oryzopsis hymenoides), Anderson's thornbush (Lycium Andersoni), desert peach (Prunus Andersoni), and Fremont dalea (Dalea Fremontii). Most of the valley consists of this type; grading to the shadscale scrub type at the upper elevational ranges of the soils representative of the saltbush scrub type.

Plate 29. Vegetation in the Greyeagle Variant represents the saltbush scrub type in the alluvial areas of the valley.

The shadscale scrub zone was considered to form a distinct zone between sagebrush scrub and creosote bush scrub. It is commonly "a community of low, more or less spinescent, microphillaous shrubs of uniform physiognomy" (9 Barbour and Major) that occurs in eastern California (Plate

30). In the Saline Valley area this vegetative type appears to occupy an elevational zone between 3,000 and 4,200 feet; transitional to the sagebrush areas.

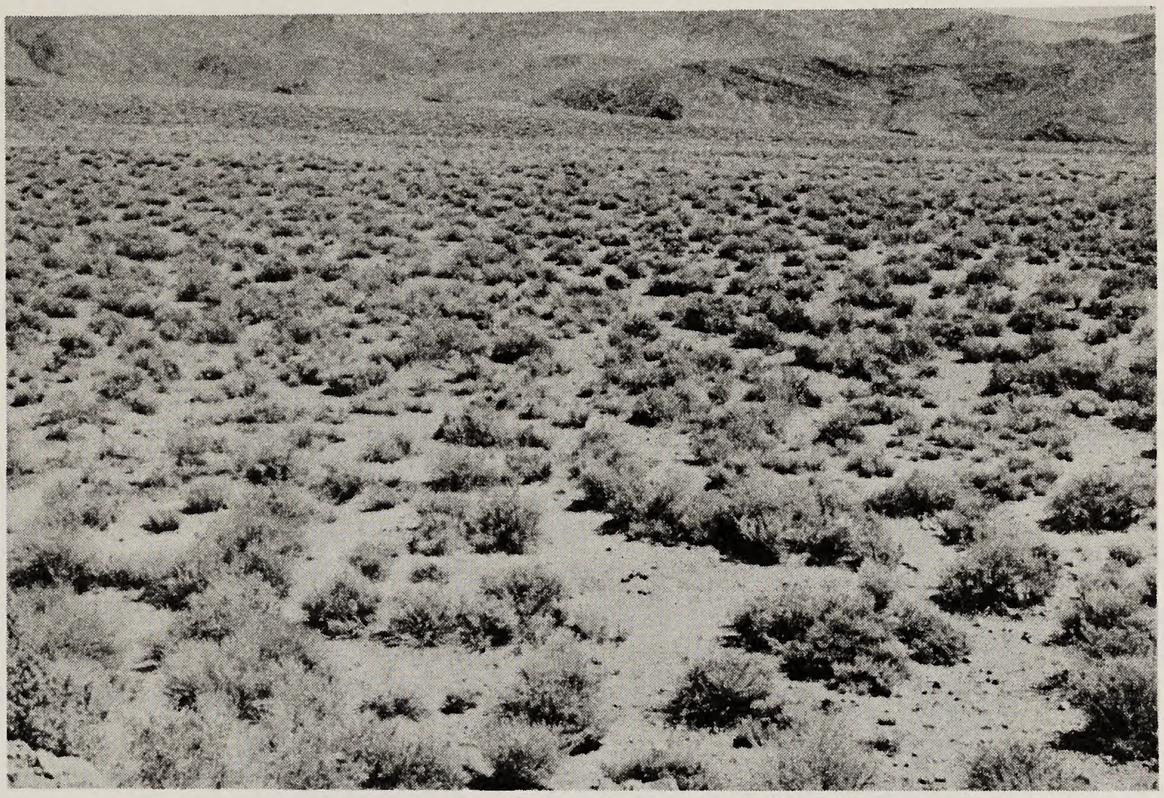


Plate 30. The Cliffdown soils support vegetation included in the shadscale scrub type.

The upper elevational ranges of the Greyeagle Variant, Yermo, Arizo Variant and Upspring soils have plant communities characteristic of this type. Lower elevational ranges of the Waucoba, Waucoba Variant, Cliffdown, and Bluewing soils have plant communities that are similar to this type and rapidly grade into the sagebrush types.

The shadscale scrub type is dominated by shadscale (Atriplex confertifolia), spiny hopsage (Grayia spinosa), white bursage (Ambrosia dumosa), and scattered bud sagebrush (Artemisia spinescens), winter-fat (Eurotia lanata), and black brush (Coleogyne ramosissima). The Saline Valley area representatives of this type usually contain fewer numbers of budsage than is characteristic in the typical plant community. A major difference in the Saline Valley area community as compared to the typical on upland slopes is the absence of Bailey greasewood (Sarcobatus baileyi). The reasons for this are unknown at this time.

Another vegetative type that appears to be transitional from the creosote bush scrub to the sagebrush scrub in the area is the joshua tree woodland (Plate 31). Areas within this type in the survey area are truly transitional to the sagebrush scrub as many of the species of both the shadscale scrub zone and the sagebrush scrub zone are present in the joshua tree woodland.

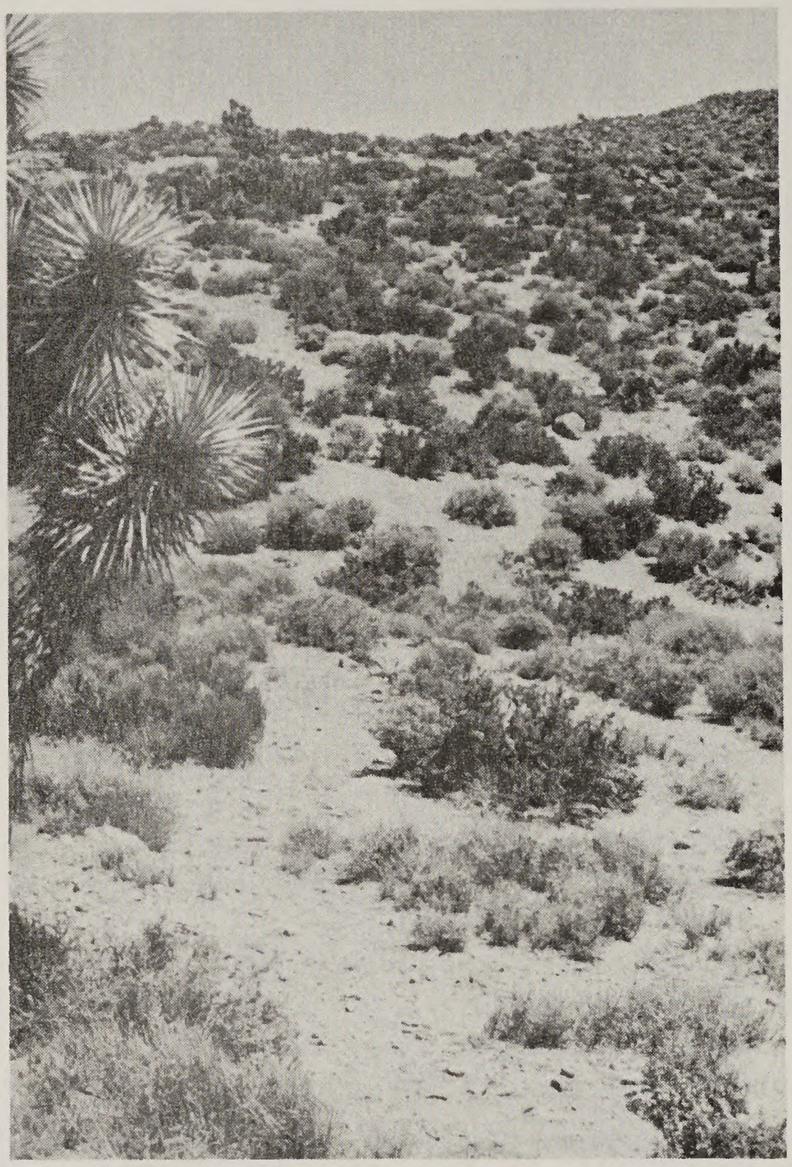


Plate. 31. The Mexispring soils support vegetation in some areas that is similar to the joshua tree woodland type.

The Tybo Variant soils, a very few areas of Theriot soils, Mexispring soils, and localized areas of Torriorthents are the only areas with plant communities that are somewhat representative of the joshua tree woodland type. In almost all cases there are major differences in the present species composition compared to the potential, typical for the type. Many of the species present in the potential community are completely absent in the Saline Valley area.

The plants representative of this type in the survey area include joshua tree (Yucca brevifolia), Mormon tea (Ephedra nevadensis), Coopers goldenbush (Haplopappus Cooperii), linear leaved goldenbush (Haplopappus linearfolius), burro bush (Hymenoclea salsola), Anderson's thorn bush (Lycium Andersonii), spiny menodora (Menodora spinescens), four-o-clock (Mirabilis biglovii), beavertail cactus (Opunta spp.), desert needlegrass (Stipa speciosa), and scattered big sagebrush (Artemisia tridentata).

There appears to be no areas of the joshua tree woodland type characteristically dominated by annuals as were observed in the characterized areas in Nevada (9 Barbour and Major).

Sagebrush steppe: The largest single group of plant communities in the survey area is the sagebrush steppe. It occurs from elevation of 4,200 to 11,000 feet. Although primarily represented in the Modoc Plateau area, the sagebrush communities in this survey area are characteristically similar to the typical sagebrush steppe of the Modoc Plateau, with the exception of a few climax species and grasses within the major community.

"The sagebrush steppe consists of a series of generally treeless, shrub-dominated communities. . . Species of Artemisia are the dominant shrubs, with perennial bunch grasses characterizing the understory." (9 Barbour and Major).

There are many habitats within the four major Artemisia species. The Bluewing soils have a habitat that is somewhat potentially characteristic of the Artemisia tridentata/Oryzopsis hymenoides unit. These sandy, somewhat droughty soils have an overstory community potentially consisting of big sagebrush (Artemisia tridentata), Mormon tea (Ephedra nevadensis), spiny hopsage (Grayia spinosa), shadscale (Atriplex confertifolia), rubber rabbitbrush (Crysothamnus nauseosus), desert peach (Prunus Andersonii), and little horsebrush (Tetradymia glabrata). The Understory grasses consist of primarily indian ricegrass (Oryzopsis hymenoides) with a few scattered areas with bottle brush squirreltail (Sitanion hystrix), and cheat grass (Bromus tectorum). This vegetative unit is one which very closely resembles the community described as typical.

In the same 4,200 to 6,500 feet elevational zone as the Bluewing soils occurs the slightly finer Cliffdown soils. The vegetation in the Cliffdown as well as in the Luckyrich, Panamint, phases of the Mexispring soil, Ulida, Waucoba, and Waucoba Variant in the 4,200 to 8,000 feet elevational zone appear to classify into the Artemisia tridentata/Stipa speciosa group (Plate 32). The elevational ranges and moderately coarse to medium textured soils seem to be the deciding factor on whether the understory is, potentially, primarily desert needlegrass (Stipa speciosa) rather than indian ricegrass (Oryzopsis hymenoides).

Plate 32. The (ARTR/STSP) Artemisia tridentata/Stipa speciosa type is represented on the Panamint soil.

Although the soils differ significanlly in percentage species composition and potential production, the major species groups are similar. The dominant overstory shrubs are big sagebrush (Artemisia tridentata), green rabbitbrush (Chysothamnus viscidiflorus), desert peach (Prunus Andersonii), spiny hopsage (Grayia spinosa), and sulfur flower (Erigonum umbellatum). The primary understory plants are desert needlegrass (Stipa speciosa), indian ricegrass (Oryzopsis hymenoides), and cheat grass (Bromus tectorum).

This group differs significantly in plant composition for the typical described in the Modoc Plateau. In the Saline Valley area spring phlox (Leptodactylon pungens), Thurber's needlegrass (Stipa Thurberiana),and western needlegrass (Stipa occidentalis) seem to be absent from the potential community (Plate 33).

Plate 33. The Ulida soils potentially classify within the ARTR/ STSP type, but due to grazing pressure, much of the understory is gone.

The third major Artemisia tridentata group occurs on the Luckyrich Variant soils. These soils are moderately coarse in texture; and because they occur in intermountain valleys, the receive more effective moisture from runoff. These areas appear to be potentially in the Artemisia tridentata/Elymus cinerus group (Plate 34). In the Saline Valley survey area the Luckyrich Variant soils appear to have been disturbed by fire, extensive grazing, or flood and are not in a present condition class that approaches climax.

The potential overstory plant is predominately big sagebrush (Artemsia tridentata); although, at present, significant amounts of rubber rabbitbrush (Chrysothamnus nauseosus) occur that would probably not be present in the climax community.

Plate 34. Moderately coarse textures and relatively high yearly moisture content for the Luckyrich Variant soils yields a high vegetative potential production within the (ARTR/ELCI) *Artemisia tridentata/Elymus cinera type*.

The understory grasses consists primarily of great basin wildrye (*Elymus cinera*). The typical plant community for this group also includes sandberg bluegrass (*Poa Sandbergii*), bluebunch wheatgrass (*Agropyon spicatum*), and cheat grass (*Bromus tectorum*). As the survey area is in the southern most extension of the sagebrush steppe area, it is questionable whether the potential plant community would include the bluegrass, and wheatgrasses. It appears that they have been replaced by bottlebrush squirrel tail (*Sitanion hysterix*) and another unidentified *Poa* species.

In some areas, soils that have plant communities in the pinion-juniper groups have localized spots of the vegetative unit *Artemisia tridentata/Hilaria Jamesii*. The Huntmount soils appear to be in this group. Some areas of the Panamint soils have a plant community that is similar to this unit. Representative overstory plants include big

sagebrush (Artemisia tridentata), spiny hopsage (Grayia spinosa), shadscale (Atriplex confertifolia), four-wing saltbush (Atriplex canescens), bud sagebrush (Artemisia spinescens), Mormon tea (Ephedra nevadensis), and scattered winterfat (Eurotia lanata). Understory grasses consist of galleta (Hilaria Jamesii), indian ricegrass (Oryzopsis hymenoides), and needle-and-thread (Stipa comata). The sand dropseed (Sporobolus cryptandrus), included in the typifying group, appears to be absent in this survey area.

At the higher elevations, 4,200 to 11,00 feet, on shallow, calcareous soils occur the Artemisia arbuscula and Artemisia nova groups. Areas that should classify in Artemisia arbuscula groups in this survey area appear to be transitional to and intermixed with areas in the Artemisia nova groups. Separations of these groups are difficult in this area and both groupings will be discussed together. Artemisia nova groups often occupy the younger soils in the cooler Artemisia groups. Soils in this survey area where A. arbuscula and A. nova occur are so steep that the relative ages of the soils are about the same; as erosion removes the soil nearly as fast as it forms.

Soils in the mesic family that are shallow to hard rock such as the Theriot soils tend to have some areas with plant communities that classify in a group not included in the vegetative classification system used in this discussion. The observed community places Theriot soils in an Artemisia arbuscula/Artemisia tridenta/Aristida ssp. group. These areas appear to be transitional between the Artemisia tridentata groups and the Artemisia nova groups. This community consists primarily of black sagebrush (Artemisia arbuscula), big sagebrush (Artemisia tridentata), and shadscale (Atriplex confertifolia) as overstory dominants; and galleta (Hilaria Jamesii), threeawn (Aristida ssp.), and indian ricegrass (Oryzopsis hymenoides) as the dominant grass understory. These areas also appear to be marginal to the Atriplex confertifolia groups.

The frigid Beveridge soils in the 8,000 to 11,000 foot elevational zone have a plant community that is somewhat similar to the Artemisia nova/Oryzopsis hymenoides group (Plate 35). As Artemisia nova prefers shallow, gravelly soils that are high in carbonates, the Beveridge soils provides ideal habitat. However, there are only a few similarities between the Beveridge's potential plant community and that described as typical for the Artemisia nova/Oryzopsis hymenoides groups.

The dominant overstory plants in the climax community are low sagebrush (Artemisia nova), green rabbit brush (Chrysothamnus viscidiflorus), green Mormon tea (Ephedra viridis), and shadscale (Atriplex confertifolia). The primary differences between the typifying group and the one in this survey area occur in the composition of understory

grasses. While the typical group includes indian ricegrass (Oryzopsis hymenoides), Sandburg bluegrass (Poa Sandbergii), needle-and-thread (Stipa comata), and galleta (Hilaria Jamesii), the understory grasses of the Beveridge soils consist primarily of indian ricegrass with scattered great basin wildrye (Elymus cinera).

Plate 35. The Beveridge soils have vegetation that resembles the (ARNO/ORHY) Artemisia nova/Oryzopsis hymenoides type.

The Cryoborolls and Xeric Torriorthents have vegetation which includes both the Cercocarpus ledifolius and pinyon-juniper groups. The Cryoborolls have characterstically, dense stands of curl leaf (Cercocarpus ledifolius) and big sagebrush (Artemisia tridentata) with scattered limber pine (Pinus flexilis) and an understory of scattered desert needlegrass (Stipa speciosa), indian ricegrass (Oryzopsis hymenoides), bottle brush squirrel tail (Sitanion hysterix), spike fescue (Hesperchloa kingii), junegrass (Koeleria cristata), and pine bluegrass (Poa scabrella). The Xeric Torriorthents have open stands of the same brush species and more understory grasses (Plate 36).

Plate 36. The Rock outcrop - Cryoborolls-Xeric Torriorthents unit has vegetation characteristics of both the (CELE) Cercocarpus ledifolius type and the (ARTR) Artemisia tridentata.

Local areas of these soils classify in the pinyon-juniper type, but appear to be transitional between the mountain brush community and transmontane coniferous communities.

Transmontane coniferous vegetation: The remaining soils in the survey area are in the Transmontane coniferous vegetative communities, primarily the Utah juniper and single leaf pinyon woodlands (Plate 37).

The Cliffdown Variant, Ferroburro, Ferroburro Variant, and Huntmount soils have vegetative communities that are in this group. Species composition varies somewhat due to soil differences as do the production values. In general the dominant overstory trees are single-leaf pinyon pine (Pinus monophylla) with localized concentrations of Utah juniper

(Juniperus osteosperma). Understory shrubs include big sagebrush (Artemisia tridentata) and scattered desert bitterbrush (Pursha glandulosa). Understory grasses vary from soil to soil, but include bottlebrush squirrel tail (Sitanion hysterix), pine bluegrass (Poa scabrella), needle-and-thread (Stipa comata), and galleta (Hileria Jamesii). In the Saline Valley area these communities are highly transionmal between the true juniper-pinyon woodland and the sagebrush steppe.

Plate 37. The Ferroburro Variant produces a fairly good cover of vegetation within the juniper-pinion woodland type.

There are very limited areas in this survey that could be classified in the subalpine woodland groups. The Cryoborolls, and Xeric Torriorthents have areas of the Limber pine woodland but these are of very limted extent and are very marginal to the typical community. They tend to be more transitional between the pinion-juniper groups, mountain brush groups, and the true limber pine woodland.

At elevations from 10,000 to 11,000 feet in the most shallow phases of the Beveridge series intermixed with rock outcrops of dolomite occur a few great basin bristlecone pines (Pinus longaeva). These areas are limited to only the highest peaks in the survey and are of extremely limited extent.

The Saline Valley area is transional between the true Great Basin and the Sonoran Desert areas. In transitional areas such as this, vegetative communities tend to display characteristics of both, and in some cases, exhibit characteristics which are unique.

GENERAL PLANT COMMUNITY MAP

(BASED ON CLASSIFICATIONS (9) BARBOUR AND MAJOR)

SALINE VALLEY SOIL SURVEY AREA

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
101 Arizo Complex 5 to 15 percent slopes.				
Arizo CBV-LS	Favorable	125	Creosote bush	30
and Arizo CB-SL	Normal	100	White bursage	10
	Unfavorable	150	Galleta	5
			Indian ricegrass	5
			White burrobush	5
			Fremont dalea	5
			Desert holly saltbrush	10
			other shrubs	20
			Annual forbs	5
102 Arizo Variant very stony loam, 2 to 9 percent slopes.				
Arizo Variant STV-L	---	---	Creosite bush	25
			Desert holly saltbrush	30
			Tidistromis	35
			Kings desertgrass	2
			Beavertail prickly pear	3
103 Badland				
104 Beveridge ver gravelly sandy loam, 30 to 75 percent slopes.				
Beveridge GRV-SL	---	---	Low Sagebrush	65
			Indian ricegrass	5
			Wildrye	2
			Single leaf pinyon	5
			Other perennial shrubs	15
			perennial and annal forbs	8

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
105 Blacktop - Rock outcrop complex, 30 to 75 percent slopes.				
Blacktop GRV-SL	--	--	Shadscale	80
			Winterfat	5
			Perennial grasses	5
			Annual forbs	10
Rock outcrop	--	--	--	--
106 Bunkerhill loamy fine sand, 0 to 2 percent slopes.				
Bunkerhill LFS	--	--	Pickleweed	95
			Perennial forbs	2
			Other perennial shrubs	3
107 Cinder land	--	--	--	--
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.				
Cliffdown GRV-L	Favorable	650	Galleta	40
	Normal	500	Indian ricegrass	15
	Unfavorable	300	Spiny hopsage	5
			Big sagebrush	10
			Shadscale	5
			Fourwing saltbush	5
			Bud sagebrush	5
			Winterfat	5
			Perennial forbs	5
			Other shrubs	3
			Annual forbs	2

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
Yermo GRV-L	Favorable	450	Desert needlegrass	5
	Normal	250	Creosote bush	25
	Unfavorable	150	White Bursage	35
			Cactus	1
			Desert aster	20
			Fourwing saltbush	5
			Fremont dalea	2
			White burrobush	5
			Other perennial grasses	2
			Other shrubs	T
			Annual forbs	T
Arizo GRV-LS	Favorable	125	Creosote bush	20
	Normal	100	White bursage	8
	Unfavorable	50	Galleta	7
			Indian ricegrass	5
			White burrobush	5
			Fremont dalea	5
			Other shrubs	30
			Perennial forbs	5
			Annual grasses	5
			Annual forbs	5
109 Cliffdown Variant very cobbly loam, 30 to 50 percent slopes.				
Cliffdown Variant CBV-L	--	--	Bottlebrush squirreltail	2
			Pine bluegrass	10
			Needle and thread	2
			Galleta	1
			Big sagebrush	15
			Singleleaf pinyon	20
			Utah juniper	20

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
			Low sagebrush	10
			Other shrubs	10
			Annual forbs	10
110 Dune land	--	--	--	--
111 Dune land - Bunkerhill association, hummocky, 0 to 9 percent slopes.				
Dune land	--	--	--	--
Bunkerhill LFS	--	--	Pickleweed	95
			Perennial forbs	2
			Other perennial shrubs	3
112 Ferroburro - Rock outcrop complex, 50 to 75 percent slopes.				
Ferroburro CB-FSL	--	--	Singleleaf pinyon	5
			Big sagebrush	10
			Desert needlegrass	2
			Bottebrsh squirreltail	10
			Green ephedra	5
			Common prickly gilia	2
			Black sagebrush	40
			Spiny hopsage	5
			Pine bluegrass	5
			Rock gooseberry	10
			Utah juniper	2
			Other shrubs	4
Rock outcrop	--	--	--	--

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
Mexispring CBV-SL	--	--	Mormon tea ephedra	10
			Desert needlegrass	5
			Joshua tree	5
			Big sagebrush	5
			Indian ricegrass	5
			California buckwheat	25
			Other shrubs	35
			Annual forbs	10
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.				
Ferroburro Variant ST-SL	--	--	Bottlebrush squirreltail	2
			Galleta	3
			Pine bluegrass	10
			Needle and thread	1
			Single leaf pinyon	15
			Utah juniper	15
			Big sagebrush	20
			Black sagebrush	20
			Desert bitterbrush	5
			Gooseberry	5
			Other shrubs	2
			Perennial forbs	1
			Annual forbs	1
114 Greyeagle - Arizo associaton, channeled, 5 to 9 percent slopes.				
Greyeagle STV-L	--	--	Creosote bush	25
			White bursage	25
			Spiny hopsage	10
			Fremont dalea	20
			Coopers goldenbush	23
			Desert needlegrass	1
			California buckwheat	2

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
			Desert aster	2
			Other perennial grasses	T
			Other shrubs	8
			Annual forbs	5
Arizo GRV-LS	Favorable	125	Creosote bush	20
	Normal	100	White bursage	8
	Unfavorable	50	Galleta	7
			Indian ricegrass	5
			White burrobush	5
			Fremont dalea	5
			Other shrubs	30
			Perennial forbs	5
			Annual grasses	5
			Annual forbs	5
115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.				
Greyeagle Variant BY-SL	--	--	Black brush	35
			Bottlebrush squirreltail	2
			California buckwheat	10
			Nevada ephedra	10
			Spiny hopsage	20
			Anderson thornbush	5
			White bursage	5
			Fremont dalea	2

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
			Indian ricegrass	1
			Desert needlegrass	1
			Other shrubs	1
			Perennial forbs	1
			Annual forbs	7
Arizo CBV-LFS	Favorable	125	Creosote bush	30
	Normal	100	White bursage	10
	Unfavorable	50	Galleta	5
			Indian ricegrass	5
			Fremont dalea	5
			Desert holly saltbush	10
			Other shrubs	20
			Perennial forbs	5
			Annual forbs	5
			White burrobush	5
116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.				
Huntmount BY-FSL	--	--	Single leaf pinyon	70
			Big sagebrush	15
			Desert needlegrass	2
			Utah juniper	1
			Other shrubs	10
			Perennial forbs	1
			Other perennial grasses	1
Ferroburro GR-SL			Single leaf pinyon	75
			Big sagebrush	10
			Bottlebrush squirreltail	2
			Other shrubs	7
			Pine bluegrass	2
			Rock goose berry	2
			Lupine	2

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
Rock outcrop	--	--	--	--
Panamint CB-VFSL	--	--	California buckwheat	5
			Desert Needlegrass	3
			Nevada ephedra	20
			Joshua tree	1
			Utah juniper	1
			single leaf pinyon	1
			Big sagebrush	15
			Spiny hopsage	20
			Black brush	25
			Spiny menodora	3
			Indian ricegrass	1
			Galleta	1
			Bottlebruh squirreltail	4
			Other shrubs	3
			Annual forbs	T
117 Luckyrich -Ulida - Luckyrich Variant association, 0 to 15 percent slopes.				
Luckyrich GR-SL	--	--	Big sagebrush	80
			Desert needlegrass	2
			Indian ricegrass	2
			Basin wildrye	2
			Single leaf pinyon	3
			Desert snowberry	5
			Other shrubs	4
			Other perennial grasses	1
			Annual forbs	1
Ulida LCOS	--	--	Big sagebrush	85
			Single leaf pinyon	3
			Basin Wildrye	4
			Desert snowberry	3
			Other shrubs	3
			Annual Frobs	2

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
Luckyrich Variant LCOS	--	--	Big sagebrush	40
			Rubber rabbitbrush	5
			Indian ricegrass	10
			Nevada ephedra	5
			Spiny hopsage	5
			Four-wing saltbush	10
			Desert peach	5
			Little horsebush	2
			Bottlebrush squirreltail	10
			Cheatgrass	5
			Perennial forbs	2
			Annual forbs	1
118 Mexispring - Luckyrich - Panamint association, 15 to 50 percent slopes.				
Mexispring CBV-SL	--	--	Mormon tea ephedra	25
			Desert needlegrass	3
			Joshua tree	10
			Indian ricegrass	2
			California buckwheat	30
			Other shrubs	20
			Annual forbs	10
Luckyrich GR-SL	--	--	Big sagebrush	15
			Desert needlegrass	1
			Indian ricegrass	2
			Spiny hopsage	15
			Mormon tea ephedra	20
			California buckwheat	5
			Basin wildrye	2
			Black brush	30

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
			Spiny menodora	5
			Other shrubs	3
			Annual forbs	2
Panamint CB-VFSL	--	--	California buckwheat	5
			Desert needlegrass	2
			Nevada ephedra	20
			Joshua tree	1
			Utah juniper	1
			Single leaf pinyon	1
			Big sagebrush	15
			Spiny hopsage	20
			Black brush	25
			Spiny menodora	3
			Indian ricegrass	1
			Galleta	1
			Bottlebrush squirreltail	3
			Other shrubs	2
			Annual forbs	T
119 Mexispring - Ulida association, 30 to 50 percent slopes.				
Mexispring CBV-SL	--	--	Mormon tea ephedra	25
			Desert needlegrass	3
			Joshua tree	10
			Indian ricegrass	2
			California buckwheat	30
			Other shrubs	20
			Annual forbs	10
Ulida LCOS	--	--	Big sagebrush	60
			Basin wildrye	2
			Desert snowberry	3
			Other shrubs	31
			Annual forbs	2
			Utah juniper	2

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
Panamint CB-VFSL	--	--	California buckwheat	5
			Desert needlegrass	2
			Nevada ephedra	20
			Joshua tree	1
			Utah juniper	1
			Single leaf pinyon	1
			Big sagebrush	15
			Spiny hopsage	20
			Black brush	25
			Spiny menodora	3
			Indian ricegrass	1
			Galleta	1
			Bottlebrush squirreltail	3
			Other shrubs	2
			Annual forbs	T
120 Osobb Variant extremely gravelly very fine sandy loam, 2 to 5 percent slopes.				
Osobb Variant GRX-VFSL	--	--	Indian ricegrass	5
			Galleta	2
			Shadscale	20
			Wolfberry	2
			Bud sagebrush	15
			Winterfat	45
			Spiny hopsage	5
			Perennial forbs	1
			Annual forbs	4
121 Playas	--	--	--	--

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
122 Riverwash - Arizo association, 0 to 5 percent slopes.				
Riverwash	--	--	--	--
Arizo STV-LFS	Favorable	125	Creosote bush	30
	Normal	100	White bursage	10
	Unfavorable	50	Galleta	5
			Indian ricegrass	5
			Fremont dalea	5
			Desert holly saltbush	10
			Other shrubs	20
			Perennial forbs	5
			Annual forbs	5
			White burrobush	5
123 Rock outcrop	--	--	--	--
135 Rock outcrop - Cryoborolls - Xeric Torriorthents association, 30 to 75 percent slopes.				
Rock outcrop	--	--	--	--
Cryoborolls	--	Variable	Desert needlegrass	1-2
			Indian ricegrass	1-2
			Bottlebrush squirreltail	0-1
			Spike fescue	1-5
			June grass	1-5
			Pine bluegrass	1-10
			Curlleaf mountain mahogany	10-25
			Single leaf pinyon	5-15
			Utah juniper	10
			Limber pine	0-5
			Big sagebrush	10-15
			Green rabbitbrush	1-2
			Other shrubs	3-5
			Annual forbs	T-5

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
Xeric Torriorthents	--	Variable	Desert needlegrass	1-2
			Indian ricegrass	1-2
			Bottlebrush squirreltail	0-1
			Spike fescue	0-1
			June grass	0-1
			Utah juniper	5-20
			Single leaf pinyon	10-20
			Big sagebrush	5-10
			Green Mormon tea	1-3
			Curlleaf mountain mahogany	0-1
			Black sagebrush	10-15
			pine bluegrass	0-1
			Other shrubs	5-10
			Annual forbs	2-5
125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes.				
Rock outcrop	--	--	--	--
Ulida BY-LCOS	--	--	Big sagebrush	80
			Single leaf pinyon	5
			Basin wildrye	2
			Other shrubs	3
			Annual forbs	1
			Desert bitterbrush	5
			Utah juniper	5
Ferroburro CB-SL	--	--	Single leaf pinyon	15
			Big sagebrush	50
			Desert needlegrass	5
			Needle and thread	5
			Bottlebrush squirreltail	5

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
			Green ephedra	5
			Wright buckwheat	2
			Other shrubs	5
			Common prickly gilia	5
			Lupine	2
			Utah juniper	1
126 Salt flats	--	--	--	--
127 Theriot extremely gravelly loam, 5 to 30 percent slopes.				
Theriot GRX-L	--	--	Shadscale	30
			White bursage	30
			Spiny menodora	5
			Galleta	1
			Bentgrass	1
			California buckwheat	10
			Other shrubs	20
			Annual forbs	3
128 Theriot extremely cobbly loam, 30 to 75 percent slopes.				
Theriot CBX-L	--	--	Shadscale	35
			White bursage	10
			Spiny menodora	5
			Nevada ephedra	5
			Big sagebrush	2
			Single leaf pinyon	1
			Utah juniper	1
			Galleta	1
			Other shrubs	14
			Annual forbs	20
			Threeawn	5
			Indian ricegrass	1

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
129 Torriorthents, stony	--	Variable	Fourwing saltbush	10
			Shadscale	10
			Annual forbs	80
130 Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slopes.				
Tybo Variant GR-VFSL	--	--	Nevada ephedra	5
			Galleta	5
			Indian ricegrass	2
			Big sagebrush	10
			Spiny hopsage	10
			Joshua tree	5
			Desert needlegrass	10
			Black brush	25
			Cooper goldenbush	10
			California buckwheat	10
			Other shrubs	10
			Perennial forbs	2
			Annual forbs	1
131 Ulida - Mexispring complex, 50 to 85 percent slopes.				
Ulida BY-LCOS	--	--	Big sagebrush	80
			Singleleaf pinyon	5
			Basin wildrye	2
			Other shrubs	3
			Annual forbs	1
			Desert bitterbrush	5
			Utah Juniper	5

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
Mexispring CBV-SL	--	--	Mormon tea ephedra	10
			Desert needlegrass	5
			Joshua tree	5
			Big sagebrush	5
			Indian ricegrass	5
			California buckwheat	25
			Other shrubs	35
			Annual forbs	10
132 Upspring - Blacktop association, 15 to 50 percent slopes.				
Upspring STV-L	--	--	Desert holly saltbush	10
			Shadscale	80
			Creosote bush	5
			Other shrubs	3
			Annual forbs	2
			Perennial grasses	T
Blacktop STV-FSL	--	--	Shadscale	80
			Winterfat	5
			Perennial grasses	5
			Annual forbs	10
133 Waucoba stony loam, 30 to 85 percent slopes.				
Waucoba ST-L	--	--	Big sagebrush	25
			Spiny hopsage	10
			Mormon tea ephedra	5
			Shadscale	20
			Indian ricegrass	5
			Desert needlegrass	5
			Other shrubs	20
			Perennial forbs	10

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
134 Waucoba Variant cobbly fine sandy loam, 30 to 75 percent slopes.				
Waucoba Variant CB-FSL	--	--	Galleta	3
			Desert needlegrass	2
			Bottlebrush squirreltail	1
			Black brush	10
			Spiny hopsage	15
			Spiny menodora	5
			Anderson thornbush	5
			Big Sagebrush	20
			Bud sagebrush	15
			Cooper goldenbush	10
			Other shrubs	9
			Annual forbs	5
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.				
Yellowrock GRV-LS	--	--	Creosote bush	96
			White bursage	1
			Desert holly saltbush	1
			Annual forbs	1
			Indian ricegrass	1
136 Yellowrock loamy fine sand, 2 to 9 percent slopes.				
Yellowrock LFS	--	--	Big sagebrush	30
			Longspine horsebrush	25
			Indian ricegrass	5
			Galleta	5
			Other shrubs	20
			Forbs	5

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.				
Yellowrock GRV-LS	--	--	Creosote bush	50
			White bursage	15
			Desert holly saltbush	20
			Tidistromis	10
			Other forbs	1
			Other shrubs	3
			Indian ricegrass	1
Bluewing GRV-LS	Favorable	300	Indian ricegrass	10
	Normal	200	Bottlebrush squirreltail	1
	Unfavorable	100	Galleta	5
			Other perennial grasses	1
			Perennial forbs	5
			Annual forbs	5
			Bud sagebrush	2
			Fourwing saltbush	5
			Spiny hopsage	10
			Spiny menodora	15
			Fremont dalea	10
			Shadscale	5
			Big sagebrush	5
			Other shrubs	13
Arizo GRV-LS	Favorable	125	Creosote bush	20
	Normal	100	White bursage	8
	Unfavorable	50	Galleta	7
			Indian ricegrass	5
			White burrobush	5
			Fremont dalea	5

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
			Other shrubs	30
			Annual forbs	5
			Perennial forbs	5
138 Yellowrock - Riverwash complex, 2 to 5 percent slopes.				
Yellowrock BYV-LS	--	--	Creosote bush	50
			White bursage	2
			Desert holly saltbush	35
			Tidestromis	8
			Annual forbs	1
			Other shrubs	3
			Indian ricegrass	1
Riverwash	--	--	--	--
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.				
Yellowrock GRV-LS	--	--	Creosote bush	50
			White bursage	15
			Desert holly saltbush	20
			Tidestromis	10
			Annual forbs	1
			Other shrubs	3
			Indian ricegrass	1
Yermo GRV-L	Favorable	450	Deset needlegrass	5
	Normal	250	Creosote bush	25
	Unfavorable	150	White bursage	35
			Cactus	1
			Desert aster	5
			Fourwing saltbush	5
			Fremont dalea	2
			White burrobush	5
			Other perennial grasses	2
			Other shrubs	15
			Annual forbs	T

TABLE C - Rangeland Productivity and Characteristic Plant Community

Map Unit/Soil	Kind of Year	Dry WT	Characteristic Vegetation	% Composition
Arizo GRV-LS	Favorable	125	Creosote bush	20
	Normal	100	White bursage	8
	Unfavorable	50	Galleta	7
			Indian ricegrass	5
			Fremont dalea	5
			Other shrubs	30
			Perennial forbs	5
			Annual forbs	5
140 Yellowrock Variant loam, 0 to 2 percent slopes.				
Yellowrock Variant L --		--	Alkali sacaton	2
			Saltgrass	1
			Arrow weed	75
			Parry saltbush	10
			Screwbean mesquite	10
			Alkali blight	2

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this section are engineers, landowners, community planners, land, land developers, builders, contractors, and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil Properties" section. The ratings were determined jointly by BLM and SCS soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to: (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table M shows, for each kind of soil, the degree and kind of limitations for building site development; table L, for sanitary facilities; and table P, for water management. Table N shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building Site Development

The degree and kind of soil limitations that affect shallow excavations, dwellings with the without basements, small commercial buildings, and local roads and streets are indicated in table M. A slight limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome. A moderate limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A severe limitation indicates one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are used for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by the soil wetness of a high seasonal water table, the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very fine, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is defined, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and small commercial buildings referred to in table M are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious limitation.

Local roads and streets referred to in table M have an all-weather surface that can carry light to medium traffic all year. They consist of subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones, all of which affect stability and ease of excavation, were also considered.

Sanitary Facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table L shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as slight, soils are generally favorable for the specified use and limitations are minor and easily overcome; if moderate, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if severe, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope may cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table could be installed or the size of the absorption field could be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soils affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with thin layers of soil. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness may be limitation because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

In the trench type of landfill, ease of excavation also affects the suitability of a soil for this purpose, so the soil must be deep to bedrock and free of large stones and boulders. Where the seasonal water table is high, water seeps into trenches and causes problems in filling.

Unless otherwise stated, the limitations in table L apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry weather. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area-type or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction Materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table N by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. it is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table H provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated good are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones They are at least moderately well drained and have slopes of 15 percent or less. Soils rated fair have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated poor.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table N provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated as a probable source has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel. Soils rated as improbable sources usually are too thin or contain too many fines to be used for sand or gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table M.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slopes, and amount of stones. The ability of the soil to support plant life is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated <u>good</u> have at least 16 inches or friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated <u>fair</u> are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated <u>poor</u> are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of <u>good</u> is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water Management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table P1 the soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

<u>Pond reservoir areas</u> hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

<u>Embankments, dikes, and levees</u> require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table P are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability, texture, depth to bedrock, hardpan, or other layers that affect the rate of water movement, depth to the water table, slope, stability of ditchbanks, susceptibility to flooding, salinity and alkalinity, and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

TABLE L - Sanitary Facilities

Map Unit/Soil	Septic Tank Absorption field	Sewage Lagoons	Trench Landfills	Area Landfills	Daily Landfill Cover
101 Arizo complex, 5 to 15 percent slopes					
Arizo CBV-LS	sev-poor filter	sev-seepage, slope, large stones	sev-seepage	sev-seepage	Sev-seepage, small stones
Arizo CBV-SL	sev-poor filter	sev-seepage, slope, large stones	sev-seepage	sev-seepage	sev-seepage, small stones
102 Arizo Varaint very stony loam, 2 to 9 percent slopes.					
Arizo varaint STV-L	sev-poor filter	sev-seepage, large stones	sev-seepage, large stones	sev-seepage	sev-seepage, small stones
103 Badland	severe	severe	severe	severe	severe
104 Beveridge very gravely sandy loam, 30 to 75 percent slopes.					
Beveridge GRV-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-slope, depth to rock	sev-slope, depth to rock	sev-area re-claim, slope, small stones
105 Blacktop - Rock outcrop comples, 30 to 75 percent slopes.					
Blacktop GRV-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-slope, depth to rock	sev-slope, depth to rock	sev-area re-claim, slope, small stones
Rock outcrop	--	--	--	--	--
106 Bunkerhill loamy fine sand, 0 to 2 percent slopes.					
Bunkerhill LFS	sev-floods, ponding	sev-seepage ponding	sev-seepage, ponding, excess sodium	sev-floods, ponding, seepage	sev-seepage, ponding, ex-cess sodium
107 Cinder land	severe	severe	severe	severe	severe
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.					
Cliffdown GRV-L	Mod-slope	sev-slope	mod-seepage, slope	mod-seepage, slope	mod-small stones, slope
Yermo GRV-L	mod-slope	sev-seepage, slope	sev-seepage	sev-seepage	mod-small stones, slope
Arizo GRV-LS	sev-poor filter	sev-seepage, slope	sev-seepage	sev-seepage	sev-seepage, small stones

TABLE L - Sanitary Facilities

Map Unit/Soil	Septic Tank Absorption field	Sewage Lagoons	Trench Landfills	Area Landfills	Daily Landfill Cover
109 Cliffdown Variant very cobbly loam, 30 to 50 percent slopes.					
Cliffdown Variant CBV-L	sev-slope, depth to rock	sev-slope depth to rock, seepage	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim
110 Dune land	severe-poor filter	severe-seepage	severe-seepage	severe-seepage	severe-to sandy
111 Dune land - Bunkerhill association, hummocky, 0 to 9 percent slopes.					
Dune lands	sev-poor filter	sev-seepage	sev-seepage	sev-seepage	sev-seepage
Bunkerhill LFS	sev-floods, ponding	sev-ponding, seepage, slope	sev-seepage, ponding, excess sodium	sev-seepage, ponding	sev-seepage, excess sodium
112 Ferroburro - Rock outcrop complex, 50 to 75 percent slopes.					
Ferroburro CB-FSL	sev-depth to rock, slope	sev-depth to rock slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
Rock outcrop	--	--	--	--	--
Mexispring CBV-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.					
Ferroburro Variant ST-SL	sev-slope depth to rock	sev-seepage, depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
114 Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.					
Greyeagle STV-L	sev-cemented pan, large stones	sev-cemented pan, slope, large stones	sev-cemented pan, large stones	sev-cemented pan	sev-area reclaim, large stones
Arizo GRV-LS	sev-poor filter	sev-seepage slope	sev-seepage	sev-seepage	sev-seepage, small stones
115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.					
Greyeagle Variant BY-SL	sev-cemented pan, large stones	sev-cemented pan, slope, large stones	sev-cemented pan, large stones	sev-cemented pan	sev-cemented, small stones
Arizo CBV-LFS	sev-poor filter	sev-seepage, slope	sev-seepage, large stones	sev-seepage	sev-seepage, small stones

TABLE L - Sanitary Facilities

Map Unit/Soil	Septic Tank Absorption field	Sewage Lagoons	Trench Landfills	Area Landfills	Daily Landfill Cover
116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.					
Huntmount	sev-slope	sev-slope, seepage	sev-slope	sev-slope	sev-slope
Ferroburro GR-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, area
Rock outcrop	--	--	--	--	--
117 Luckyrich -Ulida - Luckyrich Variant association, 0 to 15 percent slopes.					
Lucyrich GR-SL	mod-slope	sev-seepage, slope	sev-seepage	sev-seepage	mod-slope
Ulida LCOS	sev- depth to rock	sev-depth to rock	sev-depth to rock	sev-depth to rock	sev-area reclaim
Luckyrich Variant LCOS	mod-floods	sev-seepage	sev-seepage	sev-seepage	mod-too sandy
118 Mesxispring - Luckyrich - Panamint association, 15 to 50 percent slopes.					
Mexispring CBV-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
Luckyrich GR-SL	sev-slope	sev-seepage, slope	sev-seepage, slope	sev-seepage, slope	sev-slope
Panamint CB-VFSL	sev-slope	sev-seepage, depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
119 Mexispring - Ulida association, 30 to 50 percent slopes.					
Mexispring CBV-SL	sev-depth to rock, slope	sev-slope, depth to rock, large stones	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
Ulida LCOS	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
Panamint CB-VFSL	sev-slope	sev-slope, depth to rock, seepage	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope

TABLE L - Sanitary Facilities

Map Unit/Soil	Septic Tank Absorption field	Sewage Lagoons	Trench Landfills	Area Landfills	Daily Landfill Cover
120 Osobb Variant extremely gravelly very fine sandy loam, 2 to 5 percent slope.					
Osobb Variant GRX-VFSL	sev-cemented pan	sev-cemented pan	sev-cemented pan	sev-cemented pan	sev-area reclaim
121 Playas	sev-floods, ponding	sev-ponding	sev-ponding	sev-ponding	sev-ponding, excess salt, excess sodium
122 Riverwash - Arizo association, 0 to 5 percent slopes.					
Riverwash	sev-floods, poor filter, large stones	sev-floods, seepage, large stones	sev-floods, seepage, large stones	sev-floods, seepage	sev-seepage
Arizo STV-LFS	sev-poor filter, large stones	sev-seepage, large stones	sev-seepage, large stones	sev-seepage	sev-seepage, small stones
123 Rock outcrop	--	--	--	--	--
124 Rock outcrop - Cryoborolls - Xeric Torriorthents association, 30 to 75 percent slopes.					
Rock outcrop	--	--	--	--	--
Cryoborolls	sev-slope	sev-slope	sev-slope, depth to rock	sev-slope	sev-slope, area reclaim
Xeric Torriorthents	sev-slope	sev-slope	sev-slope, depth to rock	sev-slope	sev-slope, area reclaim
125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes.					
Rock outcrop	--	--	--	--	--
Ulida BY-LCOS	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
Ferroburro CB-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
126 Salt Flats	sev-floods, ponding,wetness	sev-floods, ponding, wetness	sev-floods, ponding, excess sodium	sev-ponding wetness, floods	sev-ponding, wetness, excess sodium

TABLE L - Sanitary Facilities

Map Unit/Soil	Septic Tank Absorption field	Sewage Lagoons	Trench Landfills	Area Landfills	Daily Landfill Cover
127 Theriot extremely gravelly loam, 5 to 30 percent slopes.					
Theriot GRX-L	sev-depth to rock, slope	sev-depth to rock, slope	sev-slope, depth to rock	sev-slope, depth to rock	sev-area reclaim
128 Theriot extremely cobbly loam, 30 to 75 percent slopes.					
Theriot CBX-L	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-slope, depth to rock	sev-area reclaim, slope
129 Torriorthents, stony	severe	severe	severe	severe	severe
130 Tybo Variant gravely very fine sandy loam, 2 to 5 percent slopes.					
Tybo variant GR-VFSL	sev-cemented pan, depth to	sev-cemented pan, depth to rock	sev-cemented pan, depth to rock	sev-cemented pan, depth to rock	sev-area reclaim
131 Ulida - Mexispring complex, 50 to 85 percent slopes.					
Ulida BY-LCOS	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
Mexispring	sev-depth to rock, slope, large stones	sev-depth to rock slope, large stones	sev-depth to rock, slope	sev-depth to rocck, slope	sev-area reclaim, slope
132 Upspring - Blacktop association, 15 to 50 percent slopes.					
Upspring STV-L	sev-depth to rock, slope, large stones	sev-depth to rock, slope, large stones	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
Blacktop STV-FSL	sev-depth to rock, slope, large stones	sev-depth to rock, slope, large stones	sev-depth to rock, slope	sev-depth to rock, slope	sev-area reclaim, slope
133 Waucoba stony loam, 30 to 85 percent slopes.					
Waucoba ST-L	sev-depth to rock, slope, large stones	sev-depth to rock, slope, large stones	sev-depth to rock, slope, large stones	sev-depth to rock, slope	sev-area reclaim, slope, small stones

TABLE L - Sanitary Facilities

Map Unit/Soil	Septic Tank Absorption field	Sewage Lagoons	Trench Landfills	Area Landfills	Daily Landfill Cover
134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes.					
Waucoba Variant	sev-depth to rock, slope, large stones	sev-depth to rock, slope, large stones	sev-depth to rock, slope, large stones	sev-depth to rock, slope	sev-area reclaim, slope, small stones
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.					
Yellowrock	sev-poor filter, floods	sev-seepage	sev-seepage	sev-seepage	mod-too sandy
136 Yellowrock loamy fine sand, 2 to 9 percent slopes.					
Yellowrock LFS	sev-poor filter	sev-seepage	sev-seepage	sev-seepage	mod-too sandy, slope
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.					
Yellowrock GRV-LS	sev-poor filter	sev-seepage	sev-seepage	sev-seepage	mod-too sandy, slope
Bluewing GRV-LS	sev-poor filter, floods	sev-floods, seepage	sev-floods, seepage	sev-seepage, floods	sev-seepage, small stones
Arizo GRV-LS	sev-poor filter, floods	sev-floods, seepage	sev-floods, seepage	sev-seepage, floods	sev-seepage, small stones
138 Yellowrock - Riverwas complex, 2 to 5 percent slopes.					
Yellowrock BYV-LS	sev-poor filter	sev-seepage	sev-seepage	sev-seepage	mod-too sandy
Riverwash	sev-floods, poor filter	sev-floods, seepage	sev-floods, seepage	sev-floods, seepage	sev-seepage
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.					
Yellowrock GRV-LS	sev-poor filter	sev-seepage, slope	sev-seepage	sev-seepage	mod-too sandy, slope
Yermo GRV-L	mod-slope, large stones	sev-slope,	mod-seepage, slope	mod-seepage, slope	sev-seepage, small stones
Arizo GRV-LS	sev-poor filter	sev-seepage, slope	sev-seepage	sev-seepage	sev-seepage, small stones
140 Yellowrock Variant loam, 0 to 2 percent slopes.					
Yellowrock Variant L	mod-floods	mod-seepage	mod-seepage	mod-seepage	sev-excess salt

TABLE M - Building Site Development

Map Unit/Soil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings	Local Roads and Streets
101 Arizo complex, 5 to 15 percent slopes.					
Arizo CBV-LS	sev-cutbanks cave	sev-floods	sev-floods	sev-floods	sev-floods
Arizo CBV-SL	sev-cutbanks cave	mod-slope	mod-slope	sev-slope	slight
102 Arizo Variant very stony loam, 2 to 9 percent slopes.					
Arizo Variant STV-L	sev-cutbanks cave	slight	slight	mod-slope	slight
103 Badland	severe	severe	severe	severe	severe
104 Beveridge very gravelly sandy loam, 30 to 75 percent slopes.					
Beveridge GRV-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-slope, depth to rock	sev-depth to rock, slope
105 Blacktop - Rock outcrop complex, 30 to 75 percent slopes.					
Blacktop GRV-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth rock, slope	sev-depth to rock, slope
Rock outcrop	--	--	--	--	--
106 Bunkerhill loamy fine sand, 0 to 2 percent slopes.					
Bunkerhill LFS	sev-cutbanks cave, ponding	sev-ponding	sev-ponding	sev-ponding	sev-ponding
107 Cinder land	severe	severe	severe	severe	severe
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.					
Cliffdown GRV-L	slight	mod-slope	mod-slope	sev-slope	mod-slope
Yermo GRV-L	slight	mod-slope	mod-slope	sev-slope	mod-slope
Arizo GRV-LS	sev-cutbanks cave	sev-floods	sev-floods	sev-floods	sev-floods
109 Cliffdown Variant very cobbly loam, 30 top 50 percent slopes.					
Cliffdown Variant CBV-L	sev-slope	sev-slope	sev-slope	sev-slope	sev-slope

TABLE M - Building Site Development

Map Unit/Soil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings	Local Roads and Streets
110 Dune land	sev-cutbanks cave	mod-slope	mod-slope	sev-slope	mod-slope
111 Dune land - Bunkerhill association, hummocky, 0 to 9 percent slopes.					
Dune land	sev-cutbanks cave	mod-slope	mod-slope	sev-slope	mod-slope
Bunkerhill LFS	sev-cutbanks cave, ponding	sev-ponding	sev-ponding	sev-ponding	sev-ponding
112 Ferroburro - Rock outcrop complex, 50 to 75 percent slopes.					
Ferroburro CB-FSL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
Rock outcrop	--	--	--	--	--
Mexispring CBV-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.					
Ferroburro Variant ST-SL	sev-slope	sev-slope	sev-slope	sev-slope	sev-slope
114 Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.					
Greyeagle STV-L	sev-cemented pan	sev-cemented pan	sev-cemented pan	sev-cemented pan	sev-cemented pan
Arizo GRV-LS	sev-cutbanks cave	sev-floods	sev-floods	sev-floods	mod-floods
115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.					
Greyeagle Variant BY-SL	sev-cemented pan, large stones	sev-cemented pan, large stones	sev-cemented pan, large stones	sev-cemented pan, slope, large stones	sev-cemented pan, large stones
Arizo CBV-LFS	sev-cutbanks cave	sev-floods	sev-floods	sev-floods	mod-floods, slope
116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.					
Huntmount BY-FSL	sev-slopes	sev-slope	sev-slope	sev-slope	sev-slope
Ferroburro GR-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
Rock outcrop	--	--	--	--	--

TABLE M - Building Site Development

Map Unit/Soil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings	Local Roads and Streets
117 Luckyrich - Ulida - Luckyrich Variant association, 0 to 15 percent slopes.					
Luckyrich GR-SL	mod-slope	mod-slope	mod-slope	sev-slope	mod-slope
Ulida LCOS	sev-depth to rock	sev-depth to rock	sev-depth to rock	sev-depth to rock	sev-depth to rock
Luckyrich Variant LCOS	slight	sev-floods	sev-floods	sev-floods	mod-floods
118 Mexispring - Luckyrich - Panamint association, 15 to 50 percent slopes.					
Mexispring CBV-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
Luckyrich GR-SL	sev-slope	sev-slope	sev-slope	sev-slope	sev-slope
Panamint CB-VFSL	sev-slope	sev-slope	sev-slope	sev-slope	sev-slope
119 Mexispring - Ulida association, 30 to 50 percent slopes.					
Mexispring CBV-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
Ulida LCOS	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
Panamint CB-VFSL	sev-slope	sev-slope	sev-slope	sev-slope	sev-slope
120 Osbb Variant extremely gravelly fine sandy loam, 2 to 5 percent slopes.					
Osobb Variant GRX-FSL	mod-cemented pan	mod-cemented pan	sev-cemented pan	sev-cemented pan	sev-cemented pan
121 Playas	sev-ponding	sev-ponding	sev-ponding	sev-ponding	sev-ponding
122 Riverwash - Arizo association, 0 to 5 percent slopes.					
Riverwash	sev-cutbanks cave	sev-floods	sev-floods	sev-floods	sev-floods
Arizo STV-LFS	sev-cutbanks cave	slight	slight	slight	slight
123 Rock outcrop	--	--	--	--	--
124 Rock outcrop - Cryoborolls - Xeric Torriorthents association, 30 to 75 percent slopes.					
Rock outcrop	--	--	--	--	--
Cryoborolls	sev-slope	sev-slope	sev-slope	sev-slope	sev-slope
Xeric Torriorthents	sev-slope	sev-slope	sev-slope	sev-slope	sev-slope

TABLE M - Building Site Development

Map Unit/Soil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings	Local Roads and Streets
125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes.					
Rock outcrop	--	--	--	--	--
Ulida BY-LCOS	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
Ferroburro CB-SL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
126 Salt Flats	sev-wetness, ponding	sev-wetness, ponding	sev-wetness, ponding	sev-wetness, ponding	sev-wetness, ponding
127 Theriot extemely gravelly loam, 5 to 30 percent slope.					
Theriot GRX-L	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
128 Theriot extremely cobbly loam, 30 to 75 percent slopes.					
Theriot CBX-L	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
129 Torriorthents, stony	severe	severe	severe	severe	severe
130 Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slope.					
Tybo Variant GR-VFSL	sev-cemented pan, depth to rock	sev-cemented pan, depth to rock	sev-cemented pan, depth to rock	sev-cemented pan, depth to rock	sev-cemented pan, depth to rock
131 Ulida - Mexispring complex, 50 to 85 percent slopes.					
Ulida BY-LCOS	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
Mexispring CBV-FSL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
132 Upspring - Blacktop association, 15 to 50 percent slopes					
Upspring STV-L	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope

TABLE M - Building Site Development

Map Unit/Soil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings	Local Roads and Streets
Blacktop STV-FSL	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope	sev-depth to rock, slope
133 Waucoba stony loam, 30 to 85 percent slopes.					
Waucoba ST-L	sev-depth to rock, slope	sev-depth to rock, slope, large stones	sev-depth to rock, slope, large stones	sev-depth to rock, slope, large stones	sev-depth to rock, slope, large stones
134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes.					
Waucoba Variant CBX-FSL	sev-depth to rock, slope	sev-slope	sev-depth to rock, slope	sev-slope	sev-slope
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.					
Yellowrock GRV-LS	sev-cutbanks cave	sev-floods	sev-floods	sev-floods	mod-floods
136 Yellowrock loamy fine sand, 2 to 9 percent slopes.					
Yellowrock LFS	sev-cutbanks cave	slight	slight	mod-slope	slight
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.					
Yellowrock GRV-LS	sev-cutbanks cave	mod-slope	mod-slope	sev-slope	mod-slope
Bluewing GRV-LS	sev-cutbanks cave	sev-floods	sev-floods	sev-floods	sev-floods
Arizo GRV-LS	sev-cutbanks cave	sev-floods	sev-floods	sev-floods	sev-floods
138 Yellowrock - Riverwash complex, 2 to 5 percent slopes.					
Yellowrock BYV-LS	sev-cutbanks cave	slight	slight	slight	slight
Riverwash	sev-cutbanks cave	sev-floods	sev-floods	sev-floods	sev-floods
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.					
Yellowrock	sev-cutbanks cave	mod-slope	mod-slope	sev-slope	mod-slope
Yermo GRV-L	mod-slope	mod-slope	mod-slope	sev-slope	mod-slope
Arizo GRV-LS	sev-cutbanks cave	sev-floods	sev-floods	sev-floods	sev-floods

TABLE M - Building Site Development

Map Unit/Soil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings	Local Roads and Streets
140 Yellowrock Variant loam, 0 to 2 percent slopes.					
Yellowrock Variant L	slight	slight	slight	slight	slight

TABLE N - Construction Materials

Map Unit/Soil	Roadfill	Sand	Gravel	Topsoil
101 Arizo Comples, 5 to 15 percent slopes.				
Arizo CBV-LS	Fair-large stones	improbable source	probable source	poor-small stones, area reclaim
Arizo CBV-SL	Fair-large stones	probable source	improbable source	poor-small stones, area reclaim
102 Arizo Variant very stony loam, 2 to 9 percent slopes.				
Arizo Varaint STV-L	Fair-large stones	improbable source	probable sourece	poor-small stones, area reclaim
103 Badland	--	--	--	--
104 Beveridge very gravelly sandy loam, 30 to 75 percent slopes.				
Beveridge GRV-SL	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
105 Blacktop - Rock outcrop complex, 30 to 75 percent slope.				
Blacktop GRV-SL	poor-area slope	improbable source	improbable source	poor-area reclaim, slope
Rock outcrop	--	--	--	--
106 Bunkerhill loamy fine sand, 0 to 2 percent slopes				
Bunkerhill LFS	Fair-low strength	imprbable source	improbable source	poor-excess salts, excess sodium
107 Cinderland	--	--	--	--
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.				
Cliffdown GRV-L	good	improbable source	improbable source	poor-small stones, area reclaim
Yermo GRV-L	good	improbable source	improbable source	poor-small stones, area reclaim
Arizo GRV-LS	good	probable source	probable source	poor-small stones, area reclaim
109 Cliffdown Variant very cobbly loam, 30 to 50 pecent slopes.				
Cliffdown Variant	poor-slope area reclaim	improbable source	improbable source	poor-slope
110 Dune land	good	probable source	improbable source	poor-too sandy

TABLE N - Construction Materials

Map Unit/Soil	Roadfill	Sand	Gravel	Topsoil
111 Dune land - Bunkerhill association, hummocky, 0 to 9 percent slope.				
Dune land	good	probable source	improbable source	poor-too sandy
Bunkerhill LFS	fair-low strength	improbable source	improbable source	poor-excess salts, excess sodium
112 Ferroburro - Rock outcrop complex, 50 to 75 percent slope.				
Ferroburro CB-FSL	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
Rock outcrop	--	--	--	--
Mexispring CBV-SL	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.				
Ferroburro Varaint ST-SL	poor-slope	improbable source	improbable source	poor-slope
114 Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.				
Greyeagle STV-L	poor-thin layer	improbable source	improbable source	poor-area reclaim, small stones
Arizo GRV-LS	good	probable source	probable source	poor-small stones, area reclaim
115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.				
Greyeagle Variant BY-SL	poor-thin layer	improbable source	improbable source	poor-large stones, area reclaim
Arizo CBV-LFS	fair-large stones	probable source	improbable source	poor-small sstones, area reclaim
116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.				
Huntmont BY-FSL	poor-slope, low strength	improbable source	improbable source	poor-slope
Ferroburro GR-SL	poor-slope, area reclaim	improbable source	improbable source	poor-area reclaim, slope
Rock outcrop	--	--	--	--

TABLE N - Construction Materials

Map Unit/Soil	Roadfill	Sand	Gravel	Topsoil
117 Luckyrich - Ulida - Luckyrich Variant association, 0 to 15 percent slopes.				
Luckyrich GR-SL (5-15)	good	improbable source	improbable source	good
Ulida LCOS (5-9)	poor-area reclaim	improbable source	improbable source	poor-area reclaim
Luckyrich Variant LCOS (0-5)	good	improbable source	improbable source	good
118 Mexispring - Luckyrich - Panamint association, 1 to 50 percent slopes.				
Mexispring CBV-SL	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
Luckyrich GR-SL	fair-slope	improbable source	improbable source	poor-slope
Panamint CB-VFSL	poor-slope, area reclaim	improbable source	improbable source	poor-slope
119 Mexispring - Ulida association, 30 to 50 percent slopes.				
Mexispring CBL-SL	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
Ulida LCOA	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
Panamint CB-VFSL	poor-area reclaim, slope	improbable source	improbable source	poor-slope
120 Osobb Variant extremely gravelly fine sandy loam, 2 to 5 percent slopes.				
Osobb Variant GRX-FSL	poor-thin layer	improbable source	improbable source	poor-area reclaim
121 Playas	--	--	--	--
122 Riverwash - Arizo association, 0 to 5 percent slopes.				
Riverwash	good	probable source	probable source	poor-small stones
Arizo STV-LFS	fair-large stones	probable source	improbable source	poor-small stones, area reclaim
123 Rock outcrop	--	--	--	--

TABLE N - Construction Materials

Map Unit/Soil	Roadfill	Sand	Gravel	Topsoil
124 Rock outcrop - Cryoborolls - Xeric Torriorthents association, 30 to 75 percent slopes.				
Rock outcrop	--	--	--	--
Cryoborolls	poor-slope, area reclaim	improbable source	improbable source	poor-slope
Xeric Torriorthents	poor-slope, area reclaim	improbable source	improbable source	poor-slope
125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes.				
Rock outcrop	--	--	--	--
Ulida BY-LCOS	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
Ferroburro CB-SL	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
126 Salt Flats	--	--	--	--
127 Theriot extremely gravelly loam, 5 to 30 percent slopes.				
Theriot GRX-L	poor-area reclaim	improbable source	improbable source	poor-area reclaim, small stones
128 Theriot extremely cobbly loam, 30 to 75 percent slopes.				
Theriot CBX-L	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
129 Torriorthents stony	--	--	--	--
130 Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slopes.				
Tybo Variant GR-VFSL	poor-thin layer	improbable source	improbable source	poor-area reclaim
131 Ulida - Mexispring complex, 50 to 85 percent slopes.				
Ulida BY-LCOS	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
Mexispring CBV-FSL	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
132 Upspring - Blacktop association, 15 to 50 percent slopes.				
Upspring STV-L	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope

TABLE N - Construction Materials

Map Unit/Soil	Roadfill	Sand	Gravel	Topsoil
Blacktop STV-FSL	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, slope
133 Waucoba stony loam, 30 to 85 percent slope.				
Waucoba ST-L	poor-area reclaim, slope	improbable source	improbable source	poor-area reclaim, large stones, slope
134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes.				
Waucoba Variant CBX-FSL	poor-area reclaim, slope	improbable source	improbable source	poor-large stones, slope
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.				
Yellowrock GRV-LS	good	probable source	improbable source	fair-too sandy
136 Yellowrock loamy fine sand, 2 to 9 percent slopes.				
Yellowrock LFS	good	improbable source	improbable source	fair-too sandy
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.				
Yellowrock GRV-LS	good	probable source	improbable source	fair-too sandy
Bluewing GRV-LS	good	probable source	improbable source	poor-small stones, area reclaim
Arizo GRV-LS	good	probable source	probable source	poor-small stones, area reclaim
138 Yellowrock - Riverwash complex, 2 to 5 percent slopes.				
Yellowrock BYV-LS	fair-large stones	probable source	improbable source	fair-too sandy
Riverwash	fair-large stones	probable source	probable source	poor-small stones, too sandy
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.				
Yellowrock GRV-LS	good	probable	improbable	fair-too

TABLE N - Construction Materials

Map Unit/Soil	Roadfill	Sand	Gravel	Topsoil
Yermo GRV-L	good	improbable source	improbable source	poor-small stones, area reclaim
Arizo GRV-LS	good	probable source	probable source	poor-small stones, area reclaim
140 Yellowrock Variant loam, 0 to 2 percent slopes.				
Yellowrock Variant L	fair-low strength	improbable source	improbable source	poor-excess salts

TABLE P1 - Water Management

Map Unit/Soil	Pond Reservior Areas	Embankments Dikes & Levees	Aquafer-fed Excavated Ponds	Drainage	Irrigation	Terraces Diversions	Grassed Waterways
101 Arizo Complex, 5 to 15 percent slopes.							
Arizo CBV-LS	seepage, slope	seepage, piping	no water	floods	slope, droughty	slope, large stones, too sandy	slope, droughty, large stones
Arizo CBV-SL	seepage, slope	seepage, piping	no water	--	slope, droughty	slope, large stones, too sandy	slope, droughty, large stones
102 Arizo Variant very stony loam, 2 to 9 percent slopes							
Arizo Variant	seepage, slope	seepage, piping	no water	--	slope, droughty	large stones, too sandy, soil blowing	large stones, droughty
103 Badland		--	--	--	--	--	--
104 Beveridge very gravelly sandy loam, 30 to 75 percent slopes.							
Beveridge GRV-SL	depth to rock, slope	thin layer	no water	--	slope, depth to rock	slope, depth to rock	depth to rock, slope
105 Blacktop - Rock outcrop complex, 30 to 75 percent slopes.							
Blacktop GRV-SL	depth to rock, slope	seepage, thin layer	no water	--	slope, depth to rock	slope, depth to rock	depth to rock slope
Rock outcrop	--	--	--	--	--	--	--
Bunkerhill	seepage	seepage, piping, excess sodium	salt water, cutbanks cave	ponding, excess salt, excess sodium	ponding, excess sodium, excess salt	ponding, soil blowing	excess salt, excess sodium
107 Cinder land	--	--	--	--	--	--	--
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.							
Cliffdown GRV-L	slope	seepage	no water	--	slope	slope, soil blowing	slope

TABLE P1 - Water Management

Map Unit/Soil	Pond Reservior Areas	Embankments Dikes & Levees	Aquafer-fed Excavated Ponds	Drainage	Irrigation	Terraces Diversions	Grassed Waterways
Yermo	slope	seepage	no water	--	slope	slope, soil blowing	slope
Arizo GRV-LS	seepage, slope	seepage, piping	no water	floods	slope, droughty	slope, too sandy	slope, droughty
109 Cliffdown Variant very cobbly loam, 30 to 50 percent slopes.							
Cliffdown CBV-L	slope , depth to rock	large stones	no water	--	slope	slope, depth to rock, large stones	slope
110 Dune land	--	--	--	--	--	--	--
111 Dune land - Bunkerhill association, hummocky, 0 to 9 percent slopes.							
Dune land	--	--	--	--	--	--	--
Bunkerhill LFS	seepage	seepage, piping excess sodium	salty water, cutbanks cave	ponding, excess salt, excess sodium	ponding, excess salt, excess sodium	ponding, soil blowing	excess salt, excess sodium
112 Ferroburro - Rock outcrop complex, 50 to 75 percent slopes.							
Ferroburro CB-FSL	depth to rock, slope	thin layer	no water	--	slope, depth to rock	slope, depth to rock	slope, depth to rock
Rock outcrop	--	--	--	--	--	--	--
Mexispring CBV-SL	depth to rock, slope	thin layer, large stones	no water	--	slope, depth to rock large stones	slope, depth to rock,	slope, depth to rock
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.							
Ferroburro Variant ST-SL	depth to rock, slope	thin layer	no water	--	slope, depth to rock	slope, depth to rock, large stones	slope, depth to rock
114 Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.							

TABLE P1 - Water Management

Map Unit/Soil	Pond Reservior Areas	Embankments Dikes & Levees	Aquafer-fed Excavated Ponds	Drainage	Irrigation	Terraces Diversions	Grassed Waterways
Greyeagle STV-L	cemented pan, slope	thin layer, seepage, piping	no water	--	cemented pan, slope	cemented pan, large stones	cemented pan, large stones
Arizo GRV-LS	seepage, slope	seepage, piping	no water	floods	slope, droughty	too sandy	droughty
115 Greyegle Varaint - Arizo association, 5 to 15 percent slopes.							
Greyeagle Variant BY-SL	cemented pan. slope	thin layer, large stones	no water	--	cemented pan, slope	cemented pan, slope, large stones	semented pan, slope, large stones
Arizo CBV-LFS	seepage, slope	seepage, piping, large stones	no water	floods	slope, droughty	slope, large stones, too sandy	slope, large stones, droughty
116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.							
Huntmount BY-FSL	slope	piping	no water	--	slope	slope	slope
Ferroburro	depth to rock, slope	thin layer	no water	--	slope, depth to rock	slope, depth to rock	slope, depth to rock
117 Luckyrich - Ulida - Luckyrich Variant association, 0 to 15 percent slopes.							
Luckyrich GR-SL	seepage, slope	piping	no water	--	slope	slope	slope
Ulida LCOS	depth to rock,	thin layer	no water	--	depth to rock,	depth to rock	depth to rock
Luckyrich Variant LCOS	seepage	piping	deep to water	--	favorable	favorable	favorable
118 Mexispring - Luckyrich - Panamint association, 15 to 50 p;ercent slopes.							
Mexispring CBV-SL	depth to rock, slope	thin layer, seepage	no water	--	depth to rock, slope	slope, depth to rock, large stones	slope, depth to rock, large stones
Luckyrich GR-SL	slope, seepage	piping	no water	--	slope	slope	slope

TABLE P1 - Water Management

Map Unit/Soil	Pond Reservior Areas	Embankments Dikes & Levees	Aquafer-fed Excavated Ponds	Drainage	Irrigation	Terraces Diversions	Grassed Waterways
Panamint CB-VFSL	slope, depth to rock	piping	no water	--	depth to rock, slope	slope, depth to rock	slope, depth to rock
119 Mexispring - Ulida association, 30 to 50 percent slopes.							
Mexispring CBV-SL	dept to rock, slope	thin layer, seepage	no water	--	depth to rock, slope	slope, depth to rock, large stones	slope, depth to rock, large stones
Ulida LCOS	depth to rock, slope	thin layer	no water	--	depth to rock, slope	slope, depth to rock	slope, depth to rock
Panamint CB-VFSL	slope, depth to rock	piping	no water	--	depth to rock, slope	slope, depth to rock	slope, depth to rock
120 Osobb Variant extremely gravelly fine sandy loam, 2 to 5 percent slopes.							
Osobb Variant GRX-FSL	cemented pan, seepage	thin layer, seepage	no water	--	cemented pan, slope	cemented pan, soil blowing	cemented pan
121 Playas	slight	excess salt	deep to water	ponding, excess salt	excess salt	ponding, blowing, percs slowly	excess salt
122 Riverwash - Arizo association, 0 to 5 percent slopes.							
Riverwash	seepage	seepage, piping	no water	floods	droughty, floods	large stones	droughty
Arizo STV-LFS	seepage	seepage	no water	--	droughty	large stones	droughty, large stones
123 Rock outcrop	--	--	--	--	--	--	--
124 Rock outcrop - Cryoborolls - Xeric Torriorthents association, 30 to 75 percent slopes.							
Rock outcrop	--	--	--	--	--	--	--
Cryoborolls	slope, depth to rock	piping	no water	--	depth to rock, slope	slope, depth to rock	slope, depth to rock
Xeric Torriorthents	slope, depth to rock	piping	no water	--	depth to rock, slope	slope, depth to rock	slope, depth to rock

TABLE P1 - Water Management

Map Unit/Soil	Pond Reservior Areas	Embankments Dikes & Levees	Aquafer-fed Excavated Ponds	Drainage	Irrigation	Terraces Diversions	Grassed Waterways
125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes.							
Rock outcrop	--	--	--	--	--	--	--
Ulida BY-LCOS	depth to rock, slope	thin layer	no water	--	depth to rock, slope	slope, depth to rock	slope, depth to rock
Ferroburro CB-SL	depth to rock, slope	thin layer	no water	--	depth to rock, slope	slope, depth to rock	slope, depth to rock
126 Salt flats	favorable	excess sodium, excess salt	salty water	ponding, excess sodium	excess salt, excess sodium, ponding	ponding, wetness, percs slowly	wetness, excess sodium, excess salt
Theriot GRX-L	depth to rock, slope	thin layer, seepage	no water	--	depth to rock, slope	slope, depth to rock	slope, depth to rock
128 Theriot extremely cobbly loam, 30 to 75 percent slopes.							
Theriot CBX-L	depth to rock, slope	thin layer, seepage	no water	--	depth to rock, slope	slope, depth to rock	slope, depth to rock
129 Torriorthents, stony		--	--	--	--	--	--
130 Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slopes.							
Tybo Variant GR-VFSL	cemented pan, depth to rock	thin layer, piping	no water	--	cemented pan, depth to rock	cemented pan, depth to rock, soil blowing	cemented pan, depth to rock
131 Ulida - Mexispring complex, 50 to 85 percnet slopes.							
Ulida BY-LCOS	depth to rock, slope	thin layer	no water	--	depth to rock, slope	depth to rock, slope	depth to rock, slope
Mexispring CBV-FSL	depth to rock, slope	thin layer, seepage	no water	--	depth to rock, slope	slope, depth to rock, large stones	slope, depth to rock, large stones
132 Upspring - Blacktop association, 15 to 50 percent slopes.							
Upspring STV-L	depth to rock, slope	thin layer, seepage	no water	--	depth to rock, slope	slope, depth to rock, larae stones	slope, depth to rock, larae stones

TABLE P1 - Water Management

Map Unit/Soil	Pond Reservior Areas	Embankments Dikes & Levees	Aquafer-fed Excavated Ponds	Drainage	Irrigation	Terraces Diversions	Grassed Waterways
Blacktop STV-FSL	depth to rock, slope	thin layer, seepage	no water	--	depth to rock, slope	slope, depth to rock, large stones	slope, depth to rock, large stones
Waucoba ST-L	depth to rock, slope	thin layer, seepage, large stones	no water	--	depth to rock, slope	slope, depth to rock, large stones	slope depth to rock, large stones
134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes.							
Waucoba Variant CBX-FSL	depth to rock, slope	seepage, large stones	no water	--	depth to rock, slope	slope, depth to rock, large stones	slope, depth to rock, large stones
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.							
Yellowrock GRV-LS	seepage	seepage, piping	no water	--	slope droughty	to sandy	droughty
136 Yellowrock loamy fine sand, 2 to 9 percent slopes.							
Yellowrock LFS	seepage, slope	seepage, piping	no water	--	slope	favorable	favorable
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.							
Yellowrock GRV-LS	seepage, slope	seepage, piping	no water	--	slope, droughty	to sandy, slope	droughty, slope
Bluewing GRV-LS	seepage, slope	seepage, piping	no water	floods	slope, droughty	too sandy, slope	droughty, slope
Arizo GRV-LS	seepage, slope	seepage, piping	no water	floods	slope, droughty, floods	too sandy, slope	droughty, slope
138 Yellowrock - Riverwash complex, 2 to 5 percent slopes.							
Yellowrock BYV-LS	seepage, slope	seepage, piping	no water	--	slope, droughty	too sandy	droughty
Riverwash	seepage, slope	seepage, piping	no water	floods	floods, droughty	too sandy	droughty

TABLE P1 - Water Management

Map Unit/Soil	Pond Reservior Areas	Embankments Dikes & Levees	Aquafer-fed Excavated Ponds	Drainage	Irrigation	Terraces Diversions	Grassed Waterways
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.							
Yellowrock GRV-LS	seepage, slope	seepage, piping	no water	--	slope, droughty	too sandy, slope	droughty, slope
Yermo GRV-L	slope, seepage	piping	no water	--	slope	slope, soil blowing	slope
Arizo GRV-LS	slope, seepage	seepage, piping	no water	floods	slope, droughty, floods	too sandy, slope	slope, droughty
140 Yellowrock Variant loam, 0 to 2 percent slopes.							
Yellowrock variant L	seepage	seepage, excess salt	deep to water,	excess salt	excess salt	soil blowing	excess salt

Recreation

The area is used intensively and extensively for recreation activities such as hiking, camping (Plate 38), rockhounding, off road vehicles (Plate 39), picnicking, and desert scenery enjoyment. People pressure on the area is high due to its close proximity to several major metropolitan areas.

The soils of the survey area are rated in table G according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degrees, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. Slight means that the soil properties are generally favorable and that the limitations are minor and easily overcome. Moderate means that the limitations can be overcome or alleviated by planning, design, or special maintenance. Severe means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table G can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table L, and interpretations for dwellings without basements and for local roads and streets, given in table M.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not

subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Plate 38. Primative camping is a popular recreational use of a few areas in the survey area.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Off-Road Vehicles: Uses of the area by off-road vehicles is limited by soil factors such as surface texture, stoniness, flooding, and slope. Suitability of a soil for use by offroad vehicles in not the only

consideration. One should also consider the effect the vehicle will have on the environment by considering erosion and compaction interpretations.

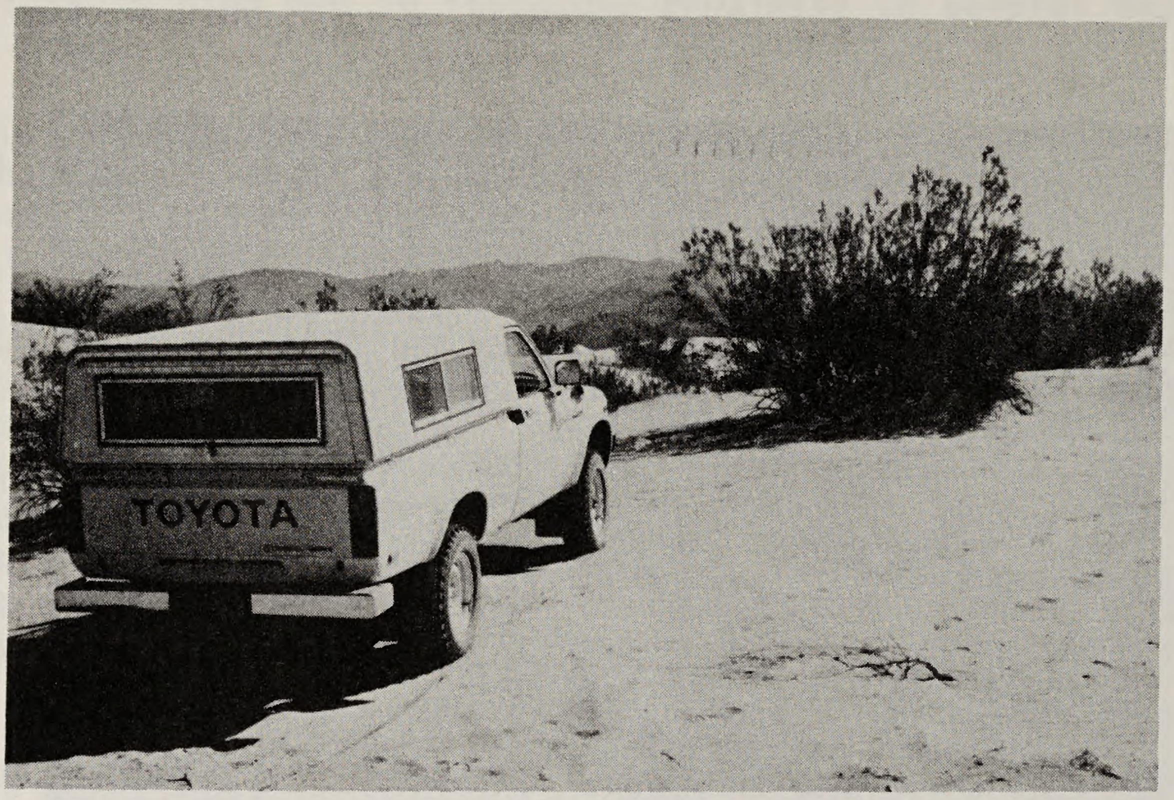


Plate 39. Another very popular form of recreation is off-road vehicle use in the sand dune areas.

TABLE G - Recreation Development

Map Unit/Soil	Off-Road Vehicles	Picnic Area	Playgrounds	Camp Areas	Paths and Trails
101 Arizo Complex, 5 to 15 percent slopes.					
Arizo CBV-LS	sev-large stones	sev-large stones	sev-large stones, slope	sev-large stones	sev-large stones
Arizo CBV-LS	sev-large stones	sev-large stones	sev-large stones, slope	sev-large stones	sev-large stones
102 Arizo Variant very stony loam, 2 to 9 percent slopes.					
Arizo Variant STV-L	sev-large stones, dusty	sev-large stones	sev-large stones, slope	sev-large stones	mod-large stones
103 Badland	severe	severe	severe	severe	severe
104 Beveridge very gravelly sandy loam, 30 to 75 percent slopes.					
Beveridge GRV-SL	sev-slope, erodes easily	sev-slope, small stones, depth to rock	sev-small stones, slope, depth to rock	sev-slope, small stones, depth to rock	sev-slope
105 Blacktop - Rock outcrop complex, 30 to 75 percent slopes.					
Blacktop GRV-SL	sev-dusty, erodes easily	sev-slope, small stones, depth to rock	sev-small stones, slope depth to rock	sev-slope, small stones, depth to rock	sev-slope
Rock outcrop	--	--	--	--	--
106 Bunkerhill loamy fine sand, 0 to 2 percent slopes.					
Bunkerhill LFS	sev-wetness, ponds	sev-excess salt, excess sodium	sev-floods, excess sodium, excess salt	sev-floods, excess sodium, excess salt	sev-ponds, floods
107 Cinder land	severe	severe	severe	severe	severe
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.					
Cliffdown GRV-L	mod-small stones	sev-small stones	sev-slope,	sev-small stones	slight
Yermo GRV-L	mod-small stones, dusty	sev-small stones	sev-slope, small stones	sev-small stones	slight
Arizo GRV-LS	mod-small stones	sev-small stones	sev-slope, small stones	sev-small stones	slight
109 Cliffdown Variant very cobbly loam, 30 to 50 percent slopes.					
Cliffdown variant CBV-L	sev-slope, erodes easily, large stones	sev-slope, large stones	sev-large stones, slope	sev-slope, large stones	sev-slope, large stones
110 Dune land	too sandy	sev-too sandy	sev-slope, too sandy	sev-too sandy	sev-too sandy

TABLE G - Recreation Development

Map Unit/Soil	Off-Road Vehicles	Picnic Area	Playgrounds	Camp Areas	Paths and Trails
111 Dune land - Bunkerhill association, hummocky, 0 to 9 percent slopes.					
Dune land S	too sandy	sev-too sandy	sev-slope, too sandy	sev-too sandy	sev-too sandy
Bunkerhill LFS	sev-wetness, ponds	sev-excess salt, excess sodium	sev-floods, excess sodium, excess salt	sev-floods, excess salts, excess sodium	sev-ponds, floods
112 Ferroburro - Rock outcrop complex, 50 to 75 percent slopes.					
Ferroburro CB-FSL	sev-slope, erodes easily	sev-slope, depth to rock	sev-slope, depth to rock	sev-slope, depth to rock	sev-slope
Rock outcrop	--	--	--	--	--
Mexispring CBV-SL	sev-slope, large stones	sev-slope, large stones, depth to rock	sev-large stones, slope, depth to rock	sev-slope, large stones, depth to rock	sev-large stones, slope
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.					
Ferroburro Variant ST-SL	sev-slope, erodes easily, large stones	sev-slope	sev-slope	sev-slope	sev-slope
114 Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.					
Greyeagle STV-L	sev-large stones, dusty, erodes easily	sev-small stones, cemented pan	sev-large stones, slope cemented pan	sev-small stones, cemented pan	sev-large stones
Arizo GRV-LS	mod-small stones	sev-small stones	sev-slope, small stones	sev-floods, small stones	slight
115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.					
Greyeagle Variant BY-SL	sev-large stones	sev-cemented pan	sev-large stones, slope, cemented pan	sev-cemented pan	mod-large stones
Arizo CBV-LFS	sev-large stones	sev-large stones	sev-large stones, slope	sev-floods, large stones	mod-large stones
116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.					
Huntmount BY-FSL	sev-slope, erodes easily	sev-slope	sev-large stones, slope	sev-slope	sev-slope
Ferroburro GR-SL	sev-slope, erodes easily	sev-slope, depth to rock	sev-slope, depth to rock	sev-slope, depth to rock	sev-slope
Rock outcrop	--	--	--	--	--
117 Luckyrich - Ulida - Luckyrich Variant association, 0 to 15 percent slopes.					
Luckyrich GR-SL	mod-erodes easily	mod-slope	sev-slope	mod-slope	slight

TABLE G - Recreation Development

Map Unit/Soil	Off-Road Vehicles	Picnic Area	Playgrounds	Camp Areas	Paths and Trails
Ulida LCOS	mod-erodes easily	sev-depth to rock	sev-slope, depth to rock	sev-depth to rock	slight
Luckyrich Variant LCOS	slight	slight	slight	slight	slight
118 Mexispring - Luckyrich - Panamint association, 15 to 50 percent slopes.					
Mexispring CBV-SL	sev-large stones, erodes easily	sev-slope, large stones, depth to rock	sev-large stones, slope, depth to rock	sev-slope, large stones, depth to rock	sev-large stones, slope
Luckyrich GR-SL	sev-erodes easily	sev-slope	sev-slope	sev-slope	mod-slope
Panamint CB-VFSL	sev-erodes easily	sev-slope	sev-slope	sev-slope	sev-slope
119 Mexispring - Ulida association, 30 to 50 percent slopes.					
Mexispring CBV-SL	sev-erodes easily, slope, large stones	sev-slope, large stones, depth to rock	sev-large stones, slope, depth to rock	sev-slope, large stones, depth to rock	sev-large stones, slope
Ulida LCOS	sev-erodes easily	sev-slope, depth to rock	sev-slope, depth to rock	sev-slope, depth to rock	sev-slope
Panamint CB-VFSL	sev-erodes easily	sev-slope	sev-slope	sev-slope	sev-slope
120 Osobb Variant extremely gravelly very fine sandy loam, 2 to 5 percent slopes.					
Osobb Variant GRX-VFSL	sev-small stones, dusty	sev-small stones, cemented pan	sev-small stones, cemented pan	sev-small stones, cemented pan	slight
121 Playas	sev-wetness, ponds	sev-excess salt, excess sodium	sev-excess sodium, excess salts, ponding	sev-floods, excess salt, excess sodium	sev-ponds, floods
122 Riverwash - Arizo assoiation, 0 to 5 percent slopes.					
Riverwash	too sandy	mod-floods	sev-floods	sev-floods	sev-too sandy
Arizo STV-LFS	mod-large stones	mod-large stones	sev-large stones	mod-large stones	sev-large stones
123 Rock outcrop	--	--	--	--	--
124 Rock outcrop - Cryoborolls - Xeric Torriorthents association, 30 to 75 percent slopes.					
Rock outcrop	--	--	--	--	--
Cryoborolls	sev-slope, erodes easily	sev-slope	sev-slope	sev-slope	sev-slope

TABLE G - Recreation Development

Map Unit/Soil	Off-Road Vehicles	Picnic Area	Playgrounds	Camp Areas	Paths and Trails
Xeric Torriorthents	sev-slope, erodes easily	sev-slope	sev-slope	sev-slope	sev-slope
125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes.					
Rock outcrop	--	--	--	--	--
Ulida BY-LCOS	sev-erodes easily	sev-slope, depth to rock	sev-large stones, slope, depth to rock	sev-slope, depth to rock	mod-slope
Ferroburro CV-SL	sev-erodes easily	sev-slope, depth to rock	sev-slope. depth to rock	sev-slope, depth to rock	sev-slope
126 Salt Flats	sev-wetness, ponds	sev-excess salt, excess sodium	sev-ponding, excess salts	sev-floods, excess salt, excess sodium	sev-pond, floods
127 Theriot extremely gravelly loam, 5 to 30 percent slopes.					
Theriot GRX-L	sev-erodes easily	sev-small stones, depth to rock	sev-slope, small stones, depth to rock	sev-small stones, depth to rock	mod-slope, small stones
128 Theriot extremely cobbly loam, 30 to 75 percent slopes.					
Theriot CBX-L	sev-erodes easily, slope	sev-slope, large stones, depth to rock	sev-large stones, slope, depth to rock	sev-slope, large stones, depth to rock	sev-large stones, slope
129 Torriorthents, stony	severe	severe	severe	severe	severe
130 Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slopes.					
Tybo Variant GR-VFSL	mod-dusty	sev-cemented pan	sev-cemented pan	sev-cemented pan	slight
131 Ulida - Mexispring complex, 50 to 85 percent slopes.					
Ulida BY-LCOS	sev-slope, erodes easily	sev-slope, depth to rock	sev-large stones, slope, depth to rock	sev-slope, depth to rock	sev-slope
Mexispring CBV-FSL	sev-slope, erodes easily	sev-slope, large stones, depth to rock	sev-large stones, slope, depth to rock	sev-slope, large stones, depth to rock	sev-slope, large stones
132 Upspring - Blacktop association, 15 to 50 percent slopes.					
Upspring STV-L	sev-erodes easily, dusty, large stones	sev-slope, depth to rock	sev-large stones, slope, depth to rock	sev-slope, depth to rock	sev-large stones, slope

TABLE G - Recreation Development

Map Unit/Soil	Off-Road Vehicles	Picnic Area	Playgrounds	Camp Areas	Paths and Trails
Blacktop STV-FSL	sev-erodes easily, dusty, large stones	sev-slope, depth to rock	sev-large stones, slope, depth to rock	sev-slope, depth to rock	sev-large stones, slope
133 Waucoba stony loam, 30 to 85 percent slopes.					
Waucoba ST-L	sev-erodes easily, slope	sev-slope, depth to rock	sev-slope, depth to rock	sev-slope, depth to rock	sev-slope
134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes.					
Waucoba Variant CBX-FSL	sev-erdoes easily, slope	sev-slope, large stones	sev-large stones, slope	sev-slope, large stones	sev-large stones, slope
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.					
Yellowrock GRV-LS	mod-floods	mod-small stones	mod-floods, slope	sev-floods,	slight
136 Yellowrock loamy fine sand, 2 to 9 percent slopes					
Yellowrock LFS	mod-erodes easily	slight	mod-slope	slight	slight
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.					
Yellowrock GRV-LS	mod-erodes easily	mod-small stones	sev-slope, small stones	mod-small stones	slight
Bluewing GRV-LS	mod-erodes easily	sev-small stones	sev-floods, small stones, slope	sev-floods, small stones	slight
Arizo GRV-LS	mod-erodes easily	sev-small stones	sev-slope, small stones, floods	sev-floods, small stones	slight
138 Yellowrock - Riverwash complex, 2 to 5 percent slopes.					
Yellowrock BYV-LS	sev-large stones	mod-large stones	sev-large stones	mod-large stones	mod-large stones
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.					
Yellowrock GRV-LS	mod-erodes easily	mod-slope, small stones	sev-slope, small stones	mod-slope, small stones	slight
Yermo GRV-L	mod-dusty, erodes easily	mod-slope, small stones	sev-slope, small stones	mod-slope, small stones	slight
Arizo GRV-LS	mod-erodes easily	sev-small stones	sev-floods, slope, small stones	sev-floods, small stones	slight
140 Yellowrock Variant loam, 0 to 2 percent slopes.					
Yellowrock variant L	slight	sev-excess salts, excess sodium	sev-excess sodium, excess salts	sev-excess salt, excess sodium	slight

Wildlife Habitat

The area supports a varied wildlife community. Feral burros and horses, many birds, lizards, and snakes inhabit the entire area. Desert kit fox, coyote, and various rodents inhabit the lower mountain slopes. Mule deer, desert bighorn sheep, quail, chukars, dove, and mountain lion inhabit the mountainous areas.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, inadequate, or inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishement of desirable plants.

In table F, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of good means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of fair means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of poor means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of very poor means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. Examples are corn, wheat, oats, and barley. The major soil properties

that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Examples are fescue, lovegrass, bromegrass, clover, and alfalfa. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestem, goldenrod, beggarweed, wheatgrass, and grama. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are pine, and juniper. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Examples are mountain mahogany, bitterbrush, and big sagebrush. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, and cordgrass and rushes, sedges, and reeds. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control devices in marshes or streams. Examples are marshes, waterfowl feeding areas, and ponds. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail rabbit, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Wetland habitat consists of open, marshy or swampy, shallow-water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs. Wildlife attracted to rangeland include antelope, white-tailed deer, desert mule deer, sage grouse, meadowlark, and lark bunting.

TABLE F - Wildlife Habitat Potentials

Map Unit/Soil	Grain & Seed	Grasses & Legumes	Wild Herbaceous Plants	Coniferous Plant	Shrubs	Wetland Plants	Shallow Water
101 Arizo complex, 5 to 15 percent slopes.							
Arizo	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
Arizo	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
102 Arizo Variant very stony loam, 2 to 9 percent slopes.							
Arizo Variant	poor	poor	poor	--	poor	v. poor	v. poor
103 Badland	v. poor	v. poor	v. poor	v. poor	v. poor	v. poor	v. poor
104 Beveridge very gravelly sandy loam, 30 to 75 percent slopes.							
Beveridge	v. poor	v. poor	poor	poor	poor	v. poor	v. poor
105 Blacktop - Rock outcrop complex, 30 to 75 percent slopes.							
Blacktop	v. poor	v. poor	poor	--	poor	v. poor	v. poor
Rock outcrop	--	--	--	--	--	--	--
106 Bunkerhill loamy fine sand, 0 to 2 percent slopes.							
Bunkerhill	poor	poor	v. poor	--	v. poor	v. poor	fair
107 Cinderland	v. poor	v. poor	v. poor	v. poor	v. poor	v. poor	v. poor
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.							
Cliffdown	poor	poor	poor	--	poor	v. poor	v. poor
Yermo	v. poor	v. poor	fair	--	poor	v. poor	v. poor
Arizo	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
109 Cliffdown Variant very cobbly loam 30 to 50 percent slopes.							
Cliffdown Variant	fair	fair	fair	fair	fair	v. poor	v. poor
110 Duneland	v. poor	v. poor	poor	--	poor	v. poor	v. poor
111 Dune land - Bunkerhill association, hummocky, 0 to 9 percent slopes.							
Duneland	v. poor	v. poor	poor	--	poor	v. poor	v. poor
Bunkerhill	poor	poor	v. poor	--	v. poor	v. poor	fair
112 Ferroburro - Rock outcrop complex, 50 to 75 percent slopes.							
Ferroburro	v. poor	v. poor	fair	fair	fair	v. poor	v. poor
Rock outcrop	--	--	--	--	--	--	--
Mexispring	v. poor	v. poor	v. poor	v. poor	poor	v. poor	v. poor

TABLE F - Wildlife Habitat Potentials

Map Unit/Soil	Grain & Seed	Grasses & Legumes	Wild Herbaceous Plants	Coniferous Plant	Shrubs	Wetland Plants	Shallow Water
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.							
Ferroburro (30-50%)	poor	poor	fair	fair	fair	v. poor	v. poor
Variant (50-75%)	v. poor	v. poor	fair	fair	fair	v. poor	v. poor
114 Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.							
Greyeagle	v. poor	v. poor	poor	--	poor	v. poor	v. poor
Arizo	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.							
Greyeagle Variant	v. poor	v. poor	poor	--	poor	v. poor	v. poor
Arizo	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.							
Huntmount	v. poor	poor	fair	good	fair	v. poor	v. poor
Ferroburro	v. poor	v. poor	fair	fair	fair	v. poor	v. poor
Rock outcrop	--	--	--	--	--	--	--
117 Luckyrich - Ulida - Luckyrich Variant association, 0 to 15 percent slopes.							
Luckyrich	poor	fair	fair	fair	fair	v. poor	v. poor
Ulida	poor	poor	fair	fair	fair	v. poor	v. poor
Luckyrich Variant	fair	good	good	good	good	good	poor
118 Mexispring - Luckyrich - Panamint assocition, 15 to 50 percent slopes.							
Mexispring	v. poor	v. poor	v. poor	v. poor	poor	v. poor	v. poor
Luckyrich	poor	fair	fair	fair	fair	v. poor	v. poor
Panamint	poor	fair	fair	fair	fair	v. poor	v. poor
119 Mexispring - Ulida association, 30 to 50 percent slopes.							
Mexispring	v. poor	v. poor	v. poor	v. poor	poor	v. poor	v. poor
Ulida	poor	poor	fair	fair	fair	v. poor	v. poor
Panamint	poor	fair	fair	fair	fair	v. poor	v. poor
120 Osobb Variant extremely gravelly very fine sandy loam, 2 to 5 percent slopes.							
Osobb variant	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor

TABLE F - Wildlife Habitat Potentials

Map Unit/Soil	Grain & Seed	Grasses & Legumes	Wild Herbaceous Plants	Coniferous Plants	Shrubs	Wetland Plants	Shallow Water
121 Playas	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
122 Riverwash - Arizo association, 0 to 5 percent slopes.							
Riverwash	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
Arizo	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
123 Rock outcrop	--	--	--	--	--	--	--
124 Rock outcrop - Cryoborolls - Xeric Torriorthents association, 30 to 75 percent slopes.							
Rock outcrop	--	--	--	--	--	--	--
Cryoborolls	v. poor	poor	fair	fair	fair	v. poor	v. poor
Xeric Torriorthents	v. poor	poor	fair	poor	fair	v. poor	v. poor
125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes.							
Rock outcrop	--	--	--	--	--	--	--
Ulida	poor	poor	fair	fair	fair	v. poor	v. poor
Ferroburro	v. poor	v. poor	fair	fair	fair	v. poor	v. poor
126 Salt Flats							
127 Theriot extremely gravelly loam, 5 to 30 percent slopes.							
Theriot	poor	fair	poor	v. poor	v. poor	v. poor	v. poor
128 Theriot extremely cobbly loam, 30 to 75 percent slopes.							
Theriot	v. poor	v. poor	poor	v. poor	v. poor	v. poor	v. poor
129 Toriorthents, stony	v. poor	v. poor	poor	v. poor	poor	v. poor	v. poor
130 Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slopes.							
Tybo Variant	v. poor	v. poor	poor	--	poor	v. poor	v. poor
131 Ulida - Mexispring complex, 50 to 85 percent slopes.							
Ulida	poor	poor	fair	fair	fair	v. poor	v. poor
Mexispring	v. poor	v. poor	v. poor	v. poor	poor	v. poor	v. poor
132 Upspring - Blacktop association, 15 to 50 percent slopes.							
Upspring	v. poor	v. poor	poor	--	poor	v. poor	v. poor
Blacktop	v. poor	v. poor	poor	--	poor	v. poor	v. poor

TABLE F - Wildlife Habitat Potentials

Map Unit/Soil	Grain & Seed	Grasses & Legumes	Wild Herbaceous Plants	Coniferous Plants	Shrubs	Wetland Plants	Shallow Water
133 Waucoba stony loam, 30 to 85 percent slopes.							
Waucoba	v. poor	v. poor	poor	poor	poor	v. poor	v. poor
134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 precent slopes.							
Waucoba Variant	v. poor	v. poor	poor	v. poor	poor	v. poor	v. poor
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.							
Yellowrock	v. poor	v. poor	poor	--	poor	v. poor	v. poor
136 Yellowrock loamy fine sand, 2 to 9 percent slopes.							
Yellowrock	v. poor	v. poor	poor	--	poor	v. poor	v. poor
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.							
Yellowrock	v. poor	v. poor	poor	--	poor	v. poor	v. poor
Bluewing	v. poor	v. poor	poor	--	poor	v. poor	v. poor
Arizo	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
138 Yellowrock - Riverwash complex, 2 to 5 percent slopes.							
Yellowrock	v. poor	v. poor	poor	--	poor	v. poor	v. poor
Riverwash	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.							
Yellowrock	v. poor	v. poor	poor	--	poor	v. poor	v. poor
Yermo	v. poor	v. poor	fair	--	poor	v. poor	v. poor
Arizo	v. poor	v. poor	v. poor	--	v. poor	v. poor	v. poor
140 Yellowrock Variant loam 0 to 2 percent slopes.							
Yellowrock Variant	v. poor	v. poor	v. poor	--	v. poor	v. poor	fair

TABLE F(1) - Wildlife Habitat Potentials

Map Unit/Soil	Openland Wildlife	Woodland Wildlife	Wetland Wildlife	Rangeland Wildlife
101 Arizo complex, 5 to 15 percent slopes.				
Arizo	v. poor	v. poor	v. poor	v. poor
Arizo	v. poor	v. poor	v. poor	v. poor
102 Arizo Variant very stony loam, 2 to 9 percent slopes.				
Arizo Variant	poor	poor	v. poor	poor
103 Badland	v. poor	v. poor	v. poor	v. poor
104 Beveridge very gravelly sandy loam, 30 to 75 percent slopes.				
Beveridge	v. poor	v. poor	v. poor	poor
105 Blacktop - Rock outcrop complex, 30 to 75 percent slopes.				
Blacktop	v. poor	v. poor	v. poor	poor
Rock outcrop	--	--	--	--
106 Bunkerhill loamy fine sand, 0 to 2 percent slopes.				
Bunkerhill	poor	v. poor	poor	v. poor
107 Cinder land	v. poor	v. poor	v. poor	v. poor
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.				
Cliffdown	poor	v. poor	v. poor	poor
Yermo	v. poor	v. poor	v. poor	poor
Arizo	v. poor	v. poor	v. poor	v. poor
109 Cliffdown Variant very cobbly loam, 30 to 50 percent slopes.				
Cliffdown Variant	fair	fair	v. poor	fair
110 Dune land	v. poor	v. poor	v. poor	poor
111 Dune land - Bunkerhill association, hummocky, 0 to 9 percent slopes.				
Dune land	v. poor	v. poor	v. poor	poor
Bunkerhill	poor	v. poor	poor	v. poor
112 Ferroburro - Rock outcrop complex, 30 to 75 percent slopes.				
Ferroburro	v. poor	fair	v. poor	fair
Rock outcrop	--	--	--	--
Mexispring	v. poor	v. poor	v. poor	v. poor

TABLE F(1) - Wildlife Habitat Potentials

Map Unit/Soil	Openland Wildlife	Woodland Wildlife	Wetland Wildlife	Rangeland Wildlife
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.				
Ferroburro (30-50%)	poor	poor	v. poor	fair
Variant 50-75% (50-75%)	v. poor	poor	v. poor	fair
114 Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.				
Greyeagle	v. poor	v. poor	v. poor	poor
Arizo	v. poor	v. poor	v. poor	v. poor
115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.				
Greyeagle Variant	v. poor	v. poor	v. poor	poor
Arizo	v. poor	v. poor	v. poor	v. poor
116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.				
Huntmount	fair	fair	v. poor	fair
Ferroburro	v. poor	fair	v. poor	fair
Rock outcrop	--	--	--	--
117 Luckyrich - Ulida - Luckyrich Variant associaiton, 0 to 15 percent slopes.				
Luckyrich	fair	fair	v. poor	fair
Ulida	poor	fair	v. poor	fair
Luckyrich Variant	good	good	fair	good
118 Mexispring - Luckyrich - Panamint association, 15 to 50 percent slopes.				
Mexispring	v. poor	v. poor	v. poor	v. poor
Luckyrich	fair	fair	v. poor	fair
Panamint	fair	fair	v. poor	fair
119 Mexispring - Ulida associaiton, 30 to 50 percent slopes.				
Mexispring	v. poor	v. poor	v. poor	v. poor
Ulida	poor	fair	v. poor	fair
Panamint	fair	fair	v. poor	fair
120 Osobb Variant extremely gravelly very fine sandy loam, 2 to 5 percent slopes.				
Osobb Variant	v. poor	v. poor	v. poor	v. poor

TABLE F(1) - Wildlife Habitat Potentials

Map Unit/Soil	Openland Wildlife	Woodland Wildlife	Wetland Wildlife	Rangeland Wildlife
121 Playas	v. poor	v. poor	poor	v. poor
122 Riverwash - Arizo association, 0 to 5 percent slopes.				
Riverwash	v. poor	v. poor	v. poor	v. poor
Arizo	v. poor	v. poor	v. poor	v. poor
123 Rock outcrop	--	--	--	--
124 Rock outcrop - Cryoborolls - Xeric Torriorthents association, 30 to 75 percent slopes.				
Rock outcrop	--	--	--	--
Cryoborolls	v. poor	fair	v. poor	fair
Xeric Torriorthents	v. poor	fair	v. poor	fair
125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes.				
Rock outcrop	--	--	--	--
Ulida	poor	fair	v. poor	fair
Ferroburro	v. poor	fair	v. poor	fair
126 Salt Falts				
127 Theriot extremely gravelly loam, 5 to 30 percent slopes.				
Theriot	poor	v. poor	v. poor	poor
128 Theriot extremely cobbly loam, 30 to 75 percent slopes.				
Theriot	v. poor	v. poor	v. poor	poor
129 Torriorthents, stony	v. poor	v. poor	v. poor	v. poor
130 Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slopes.				
Tybo Variant	v. poor	v. poor	v. poor	poor
131 Ulida - Mexispring complex, 50 to 85 percent slopes.				
Ulida	poor	fair	v. poor	fair
Mexispring	v. poor	v. poor	v. poor	v. poor
132 Upspring - Blacktop association, 15 to 50 percent slopes.				
Upspring	v. poor	v. poor	v. poor	poor
Black top	v. poor	v. poor	v. poor	poor

TABLE F(1) - Wildlife Habitat Potentials

Map Unit/Soil	Openland Wildlife	Woodland Wildlife	Wetland Wildlife	Rangeland Wildlife
133 Waucoba stony loam, 30 to 85 percent slopes.				
Waucoba	v. poor	poor	v. poor	poor
134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes.				
Waucoba Variant	v. poor	v. poor	v. poor	poor
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.				
Yellowrock	v. poor	v. poor	v. poor	poor
136 Yellowrock loamy fine sand, 2 to 9 percent slopes.				
Yellowrock	v. poor	v. poor	v. poor	poor
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.				
Yellowrock	v. poor	v. poor	v. poor	poor
Bluewing	v. poor	v. poor	v. poor	poor
Arizo	v. poor	v. poor	v. poor	v. poor
138 Yellowrock - Riverwash complex, 2 to 5 percent slopes.				
Yellowrock	v. poor	v. poor	v. poor	poor
Riverwash	v. poor	v. poor	v. poor	v. poor
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.				
Yellowrock	v. poor	v. poor	v. poor	poor
Yermo	poor	v. poor	v. poor	poor
Arizo	v. poor	v. poor	v. poor	v. poor
140 Yellowrock Variant loam, 0 to 2 percent slopes.				
Yellowrock Variant	v. poor	v. poor	poor	v. poor

Soil Properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classification, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is give in table H. Also in table H the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted in table H.

Physical and Chemical Properties

Table J shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field--particularly soil structure, porosity, and gradation or texture--that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Engineering Properties

Table H gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table H gives information for each of these contrasting horizons in a typical profile. Depth to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil Series and Morphology".

Texture is described in table H in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less

than 2 millimeters in diameter. "Loam", for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam". Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (27) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (5).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging for A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

TABLE H - Engineering Properties and Classifications

Map Unit/Soil	Depth	USDA Texture	Classifications Unified	AASHTO	Percents Passing Sieve >3"	4	10	40	200	Liquid Limit	Plastic Index
101 Arizo complex, 5 to 15 percent slopes.											
Arizo	0-4	CBV-LS	GP-GM, GM SP-SM	A-1	30-40	45-70	40-65	20-45	5-20	--	NP
	4-60	SR-GRV-S-CB-LS	GP-GM, GM, SM	A-1, A-2	10-30	40-95	35-90	20-70	10-25	--	NP
Arizo	0-4	CB-SL	SM	A-2,	25-40	65-70	60-65	25-50	10-25	15-25	NP-5
	4-60	SR-GRV-S-CB-LS	GP-GM, GM, SM	A-1, A-2	10-30	40-95	35-90	20-70	10-25	--	NP
102 Arizo Variant very stony loam, 2 to 9 percent slopes.											
Arizo variant	0-2	STV-L	GM-GC, GM	A-2, A-4	25-65	20-60	15-55	10-50	10-40	20-35	5-10
	2-5	STV-CL	GC	A-6	25-50	55-60	50-55	45-50	35-40	30-40	10-20
	5-7	GRV-SL	GM, GP-GM	A-1	15-40	35-70	30-55	15-35	5-15	25-30	NP-5
	7-26	GRX-SL GRX-COSL	GP, GP-GM	A-1	0-25	15-45	10-40	5-30	0-15	20-25	NP-5
	26-60	GRX-LCOS	GP, GP-GM	A-1	0-25	15-45	10-40	5-30	0-10	15-20	NP
103 Badland	--	--	--	--	--	--	--	--	--	--	--
104 Beveridge very gravelly sandy loam, 30 to 75 percent slopes.											
Beveridge	0-3	GRV-SL	GM	A-1	0-5	35-50	30-45	15-30	5-15	20-30	NP-5
	3-19	GRV-SL, CBX-L	GM-GC, SM-SC	A-1, A-2	20-40	50-70	45-60	20-35	10-20	20-30	NP-10
	19	UWB	--	--	--	--	--	--	--	--	--
105 Blacktop - Rock outcrop complex, 30 to 75 percent slopes.											
Blacktop	0-5	GRV-SL	GM	A-1	5-10	40-60	30-50	20-35	10-25	20-30	NP-5
	5	UWB	--	--	--	--	--	--	--	--	--
Rock outcrop	--	--	--	--	--	--	--	--	--	--	--
106 Bunkerhill loamy fine sand, 0 to 2 percent slopes.											
Bunkerhill	0-15	SR-VFS-SIL	ML, CL-ML	A-4	0	100	100	85-95	60-75	20-25	NP-5
	15-17	CEM	--	--	--	--	--	--	--	--	--
	17-50	SR-VFS-SIL	ML, CL-ML	A-4	0	100	100	85-95	60-85	20-25	NP-5

TABLE H - Engineering Properties and Classifications

Map Unit/Soil	Depth	USDA Texture	Classifications Unified	Classifications AASHTO	Percents Passing Sieve >3"	4	10	40	200	Liquid Limit	Plastic Index
107 Cinder land	--	--	--	--	--	--	--	--	--	--	--
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.											
Cliffdown	0-5	GRV-L	SM-SC, GM-GC	A-1, A-2	5-25	50-65	40-55	35-45	15-30	20-30	5-10
	5-60	GRV-SL, GRV-L	SM-SC, SM, GM, GM-GC	A-1, A-2	5-25	50-65	40-55	25-40	10-20	20-30	NP-10
Yermo	0-4	GRV-L	GM, GM-GC	A-1, A-2	5-10	65-85	60-75	35-55	20-35	20-25	NP-5
	4-60	GRV-L	GM, GM-GC	A-1, A-2, A-4	5-20	55-65	50-60	35-50	20-40	20-30	NP-10
Arizo	0-4	GRV-LS	SP-SM,	A-1	0-15	60-70	25-55	15-25	5-15	--	NP
	4-60	SR-CB-COS-GRV-LS	GP-GM, GP	A-1	0-35	35-55	20-50	10-30	0-10	--	NP
109 Cliffdown Variant very cobbly loam, 30 to 50 percent slopes.											
Cliffdown Variant	0-5	CBV-L	GM	A-4	25-35	60-65	50-60	45-55	35-45	25-30	NP-5
	5-18	GR-L	GM, SM	A-4	0-15	60-80	55-75	50-65	40-50	25-30	NP-5
	18-46	CBV-SL, GRV-SL	GM	A-1	15-30	50-55	45-50	30-35	15-30	20-25	NP-5
	46-60	STV-SL, CBV-SL	GM	A-1	15-45	5-60	50-55	30-35	15-20	20-25	NP-5
110 Dune land	--	--	--	--	--	--	--	--	--	--	--
111 Dune land - Bunkerhill association, hummocky, 0 to percent slopes.											
Dune land	--	--	--	--	--	--	--	--	--	--	--
Bunkerhill	0-20	SR-VFS-SIL	ML, CL-	A-4	0	100	100	85-95	60-75	20-25	NP-5
	20-21	CEM	--	--	--	--	--	--	--	--	--
	21-60	SR-VFS-SIL	CL-ML,	A-4	0	100	100	85-95	60-75	20-25	NP-5

TABLE H - Engineering Properties and Classifications

Map Unit/Soil	Depth	USDA Texture	Classifications Unified	AASHTO	Percents Passing Sieve >3"	4	10	40	200	Liquid Limit	Plastic Index
112 Ferroburro - Rock outcrop complex, 50 to 75 percent slopes.											
Ferroburro	0-3	CB-FSL	SM	A-1, A-2, A-4	15-25	60-90	55-85	35-65	20-45	20-25	NP-5
	3-20	CB-SL	SM	A-1, A-2, A-4	20-25	65-80	55-85	35-50	20-30	20-25	NP-5
	20-22	WB	--	--	--	--	--	--	--	--	--
Rock outcrop		--	--	--	--	--	--	--	--	--	--
Mexispring	0-3	CBV-SL	CG	A-1, A-2	25-45	60-65	55-60	35-50	20-35	20-25	NP-5
	3-14	GRV-SL	GM, GP-	A-1, A-2	0-25	20-55	15-50	10-45	5-30	20-25	NP-5
	14-20	WB	--	--	--	--	--	--	--	--	--
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.											
Ferroburro variant	0-8	ST-SL	SM	A-1, A-2	10-25	70-90	65-85	40-55	15-30	--	NP
	8-31	CB-FSL	SM	A-2	10-25	70-90	65-85	55-65	20-35	--	NP
	31-60	WB	--	--	--	--	--	--	--	--	--
114 Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.											
Greyeagle	0-3	STV-L	GM-GC	A-3, A-4	5-15	35-55	30-50	25-50	20-40	25-30	5-10
	3-6	GR-SL	SM	A-1,	0	60-75	50-65	30-45	15-30	--	NP
	6-8	GRV-SL	GP-GM, GM	A-1	0	30-55	25-50	15-35	5-20	--	NP
	8-24	CEM	--	--	--	--	--	--	--	--	--
	24-60	SR-CBV-LS-GRV-LS	GP-GM, GM	A-1	25-65	30-65	25-60	15-30	5-15	--	NP
Arizo	0-4	GRV-LS	SP-SM, SM	A-1	0-15	60-70	25-55	15-25	5-15	--	NP
	4-60	SR-CB-COS-GRV-LS	GP-GM,	A-1	15-35	35-55	20-50	10-30	0-10	--	NP
115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.											
Greyeagle variant	0-5	BY-SL	GM	A-1	10-25	50-55	45-50	30-35	15-30	20-25	NP-5

TABLE H - Engineering Properties and Classifications

Map Unit/Soil	Depth	USDA Texture	Classifications Unified	Classifications AASHTO	Percents Passing Sieve >3"	4	10	40	200	Liquid Limit	Plastic Index
Greyeagle variant (cont)	5-14	CBV-SL	GM, GM-GC	A-2	30-55	70-75	65-0	40-50	25-30	20-30	NP-5
	14-22	CEM	--	--	--	--	--	--	--	--	--
	22-60	BYX-SL, CBV-SL	SM, SM-SC	A-2	30-90	70-85	60-75	40-55	25-30	20-30	NP-10
Arizo	0-3	CBV-LFS	GP-GM, SP-SM	A-1	30-45	45-70	40-65	20-45	5-20	--	NP
	3-60	SR-GRV-S-CB-LS	GP-GM, GM, SM	A-1, A-2	10-30	40-95	35-90	20-70	10-25	--	NP
116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.											
Huntmount	0-2	BY-FSL	SM	A-2	25-40	70-85	65-80	40-65	25-35	20-30	NP-5
	2-27	FSL	SM	A-4	0-5	100	95-100	60-75	35-50	20-30	NP-5
	27-34	ST-SL	SM-SC, GM-GC	A-2	15-25	50-60	45-55	30-40	15-20	25-30	5-10
	34-63	CB-L, ST-L	CL	A-6	10-25	60-90	55-85	50-75	50-60	25-35	10-15
	63	WB	--	--	--	--	--	--	--	--	--
Ferroburro	0-6	GR-SL	SM	A-1, A-2, A-4	0-5	60-80	50-75	30-60	15-40	20-25	NP-5
	6-14	GR-SL	AM	A-1, A-2, A-4	0-5	60-80	50-75	30-60	15-40	20-25	NP-5
	14-20	WB	--	--	--	--	--	--	--	--	--
Rock outcrop	--	--	--	--	--	--	--	--	--	--	--
117 Luckyrich - Ulida - Luckyrich Variant association, 0 to 15 percent slopes.											
Luckyrich	0-30	GR-SL	SM	A-1, A-2, A-4	0	65-80	50-75	30-60	20-40	20-25	NP-5
	30-40	GR<SL	SM	A-1, A-2, A-4	0	65-80	50-75	30-60	20-40	20-25	NP-5
	40-60	WB	--	--	--	--	--	--	--	--	--
Ulida	0-2	LCOS	SM	A-2	0	80-100	75-95	50-70	10-20	--	NP
	2-5	SL	SM-SC	A-2	0	80-100	75-95	50-65	25-35	25-30	5-10
	5-15	SCL	SC	A-4	0	55-100	50-90	40-80	20-50	30-35	10-15
	15-19	GR-SL	SM, SM-SC	A-1, A-2	0	55-80	50-75	30-50	15-30	20-30	NP-10
	19-22	WB	--	--	--	--	--	--	--	--	--

TABLE H - Engineering Properties and Classifications

			Classifications		Percents Passing Sieve						
Map Unit/Soil	Depth	USDA Texture	Unified	AASHTO	>3"	4	10	40	200	Liquid Limit	Plastic Index
Luckyrich Variant	0-3	LCOS	SM	A-2, A-1	0	100	95-100	45-60	10-25	--	NP
	3-25	SL	SM, SM-SC	A-4	0	100	95-100	65-70	35-40	20-30	NP-10
	25-60	SR-SL-S	SM	A-2	0	100	80-95	50-65	20-35	20-25	NP-5
118 Mexispring - Luckyrich - Panamint association, 15 to 50 percent slopes.											
Mexispring	0-1	GBV-SL	GM	A-1, A-2	25-45	60-65	55-60	35-50	20-35	20-25	NP-5
	1-6	GRV-SL	GM, GP-GM	A-1, A-2	0-25	20-55	15-50	10-45	5-30	20-25	NP-5
	6-15	WB	--	--	--	--	--	--	--	--	--
Luckyrich	0-40	GR-SL	SM	A-1, A-2, A-4	0	65-80	50-75	30-60	20-40	20-25	NP-5
	40-60	WB	--	--	--	--	--	--	--	--	--
Panamint	0-2	CB-VFSL	SM	A-2, A-4	15-40	80-95	75-90	50-75	30-45	15-25	NP-5
	2-24	GR-FSL	SM	A-1,	0-10	60-80	50-75	40-65	20-35	15-25	NP-5
	24-60	WB	--	--	--	--	--	--	--	--	--
119 Mexispring - Ulida association, 30 to 50 percent slopes.											
Mexispring	0-4	CBV-SL	GM	A-1, A-2	25-45	60-65	55-60	35-50	20-35	20-25	NP-5
	4-6	GRV-SL	GM, GP-GM	A-1, A-2	0-25	20-55	15-50	10-45	5-30	20-25	NP-5
	6-10	WB	--	--	--	--	--	--	--	--	--
Ulida	0-5	LCOS	SM	A-2	0	80-100	75-95	50-70	10-20	--	NP
	5-15	SCL	SC	A-2, A-4	0	55-100	50-90	40-80	20-50	30-35	10-15
	15-19	GR-SL	SM-SC, SM	A-1 A-2	0	55-80	50-75	30-50	15-30	20-30	NP-10
	19-20	WB	--	--	--	--	--	--	--	--	--
Panamint	0-3	CB-VFSL	SM	A-2, A-4	15-40	80-95	75-90	50-75	30-45	15-25	NP-5
	3-30	GR-FSL	SM	A-1, A-2	0-10	60-80	50-75	40-65	20-35	15-25	NP-5
	30-60	WB	--	--	--	--	--	--	--	--	--

TABLE H - Engineering Properties and Classifications

Map Unit/Soil	Depth	USDA Texture	Classifications Unified	AASHTO	Percents Passing Sieve >3"	4	10	40	200	Liquid Limit	Plastic Index
120 Osobb Variant extremely gravelly very fine sandy loam 2 to 5 percent slopes.											
Osobb Variant	0-3	GRX-VFSL	GM	A-1	0-15	30-40	25-35	20-30	10-20	20-25	NP-5
	3-12	GRV-L	GM	A-1	0-15	30-40	25-35	20-30	10-20	20-25	NP-5
	12-16	CEM	--	--	--	--	--	--	--	--	--
	16-50	GRV-FSL	GP-GM	A-1	0-20	35-45	25-35	20-30	5-10	--	NP
121 Playas	--	--	--	--	--	--	--	--	--	--	--
122 Riverwash - Arizo assciation, 0 to 5 percent slopes.											
Riverwash	--	--	--	--	--	--	--	--	--	--	--
Arizo	0-3	STV-LFS	GP-GM, GM, SP-SM	A-1	30-45	45-70	40-65	20-45	5-20	--	NP
	3-60	SR-GRV-S-CB-LS	GP-GM, GM, SM	A-1, A-2	10-30	40-95	35-90	20-70	10-25	--	NP
123 Rock outcrop	--	--	--	--	--	--	--	--	--	--	--
124 Rock outcrop - Cryoborolls - Xeric Torriorthents association, 30 to 75 percent slopes.											
Rock outcrop	--	--	--	--	--	--	--	--	--	--	--
Cryoborolls - because of the variable nature of these soils onsite investigation is required.											
Xeric Torriorthents because of the variable nature of these soils onsite investigation is required.											
125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes.											
Rock outcrop	--	--	--	--	--	--	--	--	--	--	--
Ulida	0-6	BY-LCOS	SM	A-1, A-2	5-10	95-100	90-100	45-75	15-25	--	NP
	6-14	GR-SCL	SC	A-2, A-4	0	55-100	50-90	40-80	20-50	30-35	10-15
	14-18	GR-SL	SM, SM-SC	A-1, A-2	0	55-80	50-75	30-50	15-30	20-30	NP-10
	18-20	WB	--	--	--	--	--	--	--	--	--
Ferroburro	0-6	CB-SL	SM	A-1, A-2, A-4	15-25	60-90	55-85	35-65	20-45	20-25	NP-5
	6-14	GR-SL	SM	A-1, A-2	5-15	65-80	55-85	35-50	20-30	20-25	NP-5
	14-20	WB	--	--	--	--	--	--	--	--	--

TABLE H - Engineering Properties and Classifications

Map Unit/Soil	Depth	USDA Texture	Classifications Unified	AASHTO	Percents Passing Sieve >3"	4	10	40	200	Liquid Limit	Plastic Index

126 Salt Flats

127 Theriot extremely gravelly loam, 5 to 30 percent slopes.

Map Unit/Soil	Depth	USDA Texture	Unified	AASHTO	>3"	4	10	40	200	Liquid Limit	Plastic Index
Theriot	0-10	GRX-L	GM, GM-GC	A-1, A-2, A-4	15-45	20-60	15-55	10-50	10-40	20-30	NP-10
	10	UWB	--	--	--	--	--	--	--	--	--

128 Theriot extremely cobbly loam, 30 to 75 percent slopes.

Map Unit/Soil	Depth	USDA Texture	Unified	AASHTO	>3"	4	10	40	200	Liquid Limit	Plastic Index
Theriot	0-6	CBX-L	GM, GM-GC	A-1, A-2, A-4	15-45	20-60	15-55	10-50	10-40	20-30	NP-10
	6	UWB	--	--	--	--	--	--	--	--	--

129 Torriorthents, stony - because of the variable nature of these soils onsite investigation is required.

130 Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slopes.

Map Unit/Soil	Depth	USDA Texture	Unified	AASHTO	>3"	4	10	40	200	Liquid Limit	Plastic Index
Tybo	0-2	GR-VFSL	SM, SM-SC	A-2, A-4	0-5	60-80	55-75	45-60	30-40	20-25	NP-10
	2-10	L	SM, SM-SC, ML	A-4	0-5	80-100	75-95	50-85	35-50	20-25	NP-10
	10-14	CB-VFSL	SM, SM-SC	A-2, A-4	15-35	70-80	65-75	40-60	25-40	20-25	NP-10
	14-25	CEM	--	--	--	--	--	--	--	--	--
	25-30	WB	--	--	--	--	--	--	--	--	--
	30	UWB	--	--	--	--	--	--	--	--	--

131 Ulda - Mexispring complex, 50 to 85 percent slopes.

Map Unit/Soil	Depth	USDA Texture	Unified	AASHTO	>3"	4	10	40	200	Liquid Limit	Plastic Index
Ulida	0-3	BY-LCOS	SM	A-1, A-2	5-10	95-100	90-100	45-75	15-25	--	NP
	3-6	SL	SM-SC	A-2	0	80-100	75-95	50-65	25-35	25-30	5-10
	6-15	SCL	SC	A-2, A-4	0	55-100	50-90	40-80	20-50	30-35	10-15
	15-20	GR-SL	SM, SM-SC	A-1, A-2	0	55-80	50-75	30-50	15-30	20-30	NP-10
	20-22	WB	--	--	--	--	--	--	--	--	--
Mexispring	0-10	CBV-SL	GM	A-1, A-2	25-45	60-65	55-60	35-50	20-35	20-25	NP-5
	10-12	WB	--	--	--	--	--	--	--	--	--

TABLE H - Engineering Properties and Classifications

Map Unit/Soil	Depth	USDA Texture	Classifications Unified	AASHTO	Percents Passing Sieve >3"	4	10	40	200	Liquid Limit	Plastic Index
132 Upspring - Blacktop association, 15 to 50 percent slopes.											
Upspring	0-6	STV-L	GM	A-1, A-2	15-40	40-60	35-55	20-35	15-30	25-30	NP-5
	6-8	GRV-SL	GM	A-1	0-15	30-55	25-50	10-35	10-20	25-30	NP-5
	8	UWB	--	--	--	--	--	--	--	--	--
Blacktop	0-7	STV-FSL	GM, GM-GC, GP-GM	A-1, A-2	25-45	25-70	20-65	10-45	5-30	20-30	NP-10
	7	UWB	--	--	--	--	--	--	--	--	--
133 Waucoba stony loam, 30 to 85 percent slopes.											
Waucoba	0-3	ST-L	SM-SC, CL-ML	A-4	15-30	75-95	70-90	60-85	40-70	20-30	5-10
	3-9	GR-L	SM-SC, CL-ML	A-4	5-15	60-90	55-75	45-65	35-55	20-30	5-10
	9-19	GRV-CL	GM-GC, SM-SC, SC	A-2, A-4, A-6	20-40	50-70	40-60	30-50	20-40	30-40	5-15
	19	UWB	--	--	--	--	--	--	--	--	--
134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes.											
Waucoba Variant	0-2	CBX-FSL	GM	A-1	50-55	40-50	35-45	20-35	15-20	--	NP
	2-22	CBV-SL, CBV-L	GM, SM	A-1, A-2, A-4	30-50	50-75	45-70	30-60	15-40	20-25	NP-5
	22-23	WB	--	--	--	--	--	--	--	--	--
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.											
Yellowrock	0-3	GRV-LS	GM, GP-GM	A-1	0-10	35-55	30-50	15-30	5-20	--	NP
	3-60	SR-S-GRV-LS	SM, SP-SM	A-1	0-15	60-80	55-75	30-50	5-20	--	NP
136 Yellowrock loamy fine sand, 2 to 9 percent slopes.											
Yellowrock	0-7	LFS	SM	A-1, A-2	0	80-100	75-100	40-65	15-30	--	NP
	7-60	SR-S-GRV-L	SM, SP-SM	A-1	0-15	60-80	55-75	30-50	5-20	--	NP

TABLE H - Engineering Properties and Classifications

Map Unit/Soil	Depth	USDA Texture	Classifications Unified	Classifications AASHTO	Percents Passing Sieve >3"	4	10	40	200	Liquid Limit	Plastic Index
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.											
Yellowrock	0-4	GRV-LS	GM, GP-GM	A-1	0-10	35-55	30-50	15-30	5-20	--	NP
	4-70	SR-S-GRV-LS	SM, SP-SM	A-1	0-15	60-80	55-75	30-50	5-20	--	NP
Bluewing	0-11	GRV-LS	GP-GM	A-1	0-15	30-40	25-35	15-25	5-10	--	NP
	11-60	CBV-LS	GP-GM	A-1	25-45	50-70	40-60	30-45	0-10	--	NP
Arizo	0-4	GRV-LS	SP-SM, SM	A-1	0-15	60-70	25-55	15-25	5-15	--	NP
	4-60	SR-CB-COS-GRV-LS	GP-GM, GP	A-1	0-35	35-55	20-50	10-30	0-10	--	NP
138 Yellowrock - Riverwash complex, 2 to 5 percent slopes.											
Yellowrock	0-8	BYV-LS	GM, SM	A-1, A-2	15-50	50-95	45-90	30-70	10-25	--	NP
	8-60	SR-S-GRV-LS	SM, SP-SM	A-1	0-15	60-80	55-75	30-50	5-20	--	NP
Riverwash	--	--	--	--	--	--	--	--	--	--	--
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.											
Yellowrock	0-4	GRV-LS	GM, GP-GM	A-1	0-10	35-55	30-50	15-30	5-20	--	NP
	4-60	SR-S-GRV-LS	SM, SP-SM	A-1	0-15	60-80	55-75	30-50	5-20	--	NP
Yermo	0-3	GRV-L	GM, GM-GC	A-1	5-10	50-55	45-50	35-45	20-35	20-30	NP-10
	3-60	GRV-L	GM, GM-GC	A-1, A-2	5-20	55-65	50-60	35-50	20-40	20-30	NP-10
Arizo	0-4	GRV-LS	SP-SM,	A-1	0-15	60-70	25-55	15-25	5-15	--	NP
	4-60	SR-CB-COS-GRV-LS	GP-GM, GP	A-1	0-35	35-55	20-50	10-30	0-10	--	NP
140 Yellowrock Variant loam, 0 to 2 percent slopes.											
Yellowrock Variant	0-8	L	CL, CL-ML	A-4, A-6	0	100	100	70-95	50-75	20-35	5-15
	8-18	GR-FSL	SM-SC, GM-GC	A-2, A-4	0	55-80	50-75	35-60	20-40	20-30	5-10
	18-31	SIL	CL, CL-ML	A-4, A-6	0	100	100	85-100	50-90	30-35	5-15
	31-43	FSL	GM-GC, GM	A-1, A-2, A-4	0	40-55	35-50	20-50	15-40	20-35	NP-15

Physcial and Chemical Properties of Soils and Water Features

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Salinity is expressed as the electricl conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. The swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weekens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use

and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands These soils are very highly erodible, but vegetation can be established if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible, but vegetation can be established if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible, but vegetation can be established if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams and silty clay loams that are more than 35 percent clay. These soils are moderately erodible, but vegetation can be established if measures to control soil blowing are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely dividided calcium carbonate. These soils are slightly erodible, but vegetation can be established if measures to control soil blowing are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible, and vegetation can easily be established.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible, and vegetation can easily be established.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Soil and Water Features

Table K contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to deep, moderately well drained to well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes is not considered flooding. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence

in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the soil mapping. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-hosepower tractor, but hard bedrock generally requires blasting.

Cemented pans are hard subsurface layers, within a depth of 5 or 6 feet, that are strongly compacted (indurated). Such pans cause difficulty in excavation.. The hardness of pans is similar to that of bedrock. A rippable pan can be excavated, but a hard pan generally requires blasting.

Subsidence is the settlement of organic soils or of soils containing semifluid layers. Initial subsidence generally results from drainage. Total subsidence is initial susidence plus the slow sinking that occurs over a period of several years as a result of the oxidation or compression of organic material.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Test Data

Results of laboratory analyses on samples from selected pedons in the Saline Valley Planning Unit are presented in table J2, following.

Several pedons were analyzed for textural characteristics. Sand fraction separations were made using U.S. Standard sieves agitated by a Ro-Tap for ten minutes each sample. The sieve sequence employed (U.S.S. nos. 10, 18, 35, 60, 170, and 270) corresponds closely with sand separates as defined by the U.S. Department of Agriculture (1947). Silt and clay percentages were determined using a modified bouyoucos hydrometer method with readings at forty seconds and two hours.

TABLE J - Physical and Chemical Properties of Soils

Map Unit/Soil	Depth	Permeability	AWC "/"	pH	Salinity	Shrink Swell	Corrosion Steel	Corrosion Concrete	Erosion Factors K	Erosion Factors T	Erosion Factors Wind Group
101 Arizo Complex, 5 to 15 percent slopes.											
Arizo	0-4	2.0-6.0	.05-.07	7.4-8.4	-	Low	Low	Low	.10	5	4
	4-60	>20.0	.04-.06	7.4-8.4	-	Low	Low	Low	.10	-	-
Arizo	0-4	>.0	.05-.07	7.4-8.4	-	Low	Low	Low	.10	5	4
	4-60	>20.0	.04-.06	7.4-8.4	-	Low	Low	Low	.10	-	-
102 Arizo Variant very stony loam, 2 to 9 percent slopes.											
Arizo Variant	0-2	0.6-2.0	.08-.12	7.9-9.0	<4	Low	Low	Low	.32	5	4L
	2-5	0.2-0.6	.08-.14	7.9-9.0	<4	Mod.	Low	Low	.24	-	-
	5-7	6.0-20	.04-.12	7.9-9.0	<4	Low	Low	Low	.28	-	-
	7-26	6.0-20	.01-.09	7.9-9.0	<4	Low	Low	Low	.10	-	-
	26-60	6.0-20	.01-.05	7.9-9.0	<4	Low	Low	Low	.10	-	-
103 Badland	-	-	-	-	-	-	-	-	-	-	-
104 Beveridge very gravely sandy loam, 30 to 75 percent slopes.											
Beveridge	0-3	2.0-6.0	.05-.08	7.9-8.4	<2	Low	Low	Low	.15	1	3
	3-19	2.0-6.0	.05-.08	7.9-8.4	<2	Low	Low	Low	.24	-	-
	19	-	-	-	-	-	-	-	-	-	-
105 Blacktop - Rock outcrop complex, 30 to 75 percent slopes.											
Blacktop	0-5	0.6-2.0	.03-.10	7.9-8.4	<4	Low	Low	Low	.20	1	3
	5	-	-	-	-	-	-	-	-	-	-
Rock Outcrop	-	-	-	-	-	-	-	-	-	-	-

TABLE J - Physical and Chemical Properties of Soils

Map Unit/Soil	Depth	Permeability	AWC "/"	pH	Salinity	Shrink Swell	Corrosion Steel	Corrosion Concrete	Erosion Factors K	Erosion Factors T	Erosion Factors Wind Group
106 Bunkerhill loamy fine sand, 0 to 2 percent slopes.											
Bunkerhill	0-15	0.6-2.0	.01-.05	8.5-9.0	>16	Low	High	High	.49	5	4L
	15-17	-	-	-	-	-	-	-	-	-	-
	17-50	0.6-2.0	.01-.05	7.9-8.4	>16	Low	High	High	.49	-	-
107 Cinderland	-	-	-	-	-	-	-	-	-	-	-
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.											
Cliffdown	0-5	2.0-6.0	.08-.16	7.9-8.4	-	Low	Low	Low	.20	5	4
	5-60	2.0-6.0	.08-.12	7.9-8.4	-	Low	Low	Low	.20	-	-
Yemo	0-4	0.6-2.0	.08-.12	7.9-8.4	<2	Low	Low	Low	.28	5	4L
	4-60	2.0-6.0	.08-.12	7.9-8.4	<2	Low	Low	Low	.24	-	-
Arizo	4-6	>6.0	.05-.07	7.9-8.4	-	Low	Low	Low	.10	5	4
	4-60	>20.0	.04-.06	7.9-8.4	-	Low	Low	Low	.10	-	-
109 Cliffdown Variant very cobbly loam, 30 to 50 percent slopes.											
Cliffdown Variant	0-5	0.6-2.0	.08-.12	7.9-8.4	-	Low	Low	Low	.32	3	4L
	5-18	0.6-2.0	.10-.15	7.9-8.4	-	Low	Low	Low	.37	-	-
	18-46	2.0-6.0	.05-.08	7.9-8.4	-	Low	Low	Low	.28	-	-
	46-60	2.0-6.0	.05-.08	7.9-8.4	-	Low	Low	Low	.28	-	-
110 Duneland	-	-	-	-	-	-	-	-	-	-	-

TABLE J - Physical and Chemical Properties of Soils

Map Unit/Soil	Depth	Permeability	AWC "/"	pH	Salinity	Shrink Swell	Corrosion Steel	Corrosion Concrete	Erosion Factors K	Erosion Factors T	Erosion Factors Wind Group
111 Duneland - Bunkerhill association, hummocky, 0 to 9 percent slopes.											
Duneland	-	-	-	-	-	-	-	-	-	-	-
Bunkerhill	0-20	0.6-2.0	.01-.05	8.5-9.0	>16	Low	High	High	.49	5	4L
	20-21	-	-	-	-	-	-	-	-	-	-
	20-60	0.6-2.0	.01-.05	7.9-8.4	>16	Low	High	High	.49	-	-
112 Ferroburro - Rock outcrop complex, 50 to 75 percent slopes.											
Ferroburro	0-3	2.0-6.0	.07-.13	6.6-7.8	-	Low	Low	Low	.24	1	3
	3-20	2.0-6.0	.07-.11	6.6-7.8	-	Low	Low	Low	.24	-	-
	20-22	-	-	-	-	-	-	-	-	-	-
Rock outcrop	-	-	-	-	-	-	-	-	-	-	-
Mexispring	0-3	2.0-6.0	.07-.11	7.9-8.4	<2	Low	Low	Low	.28	1	3
	3-14	2.0-6.0	.03-.10	7.9-8.4	<2	Low	Low	Low	.28	-	-
	14-20	-	-	-	-	-	-	-	-	-	-
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.											
Ferroburro Variant	0-8	2.0-6.0	.08-.12	7.9-8.4	-	Low	Low	Low	.24	2	-
	8-31	2.0-6.0	.10-.14	7.9-8.4	-	Low	Low	Low	.28	-	-
	31-60	-	-	-	-	-	-	-	-	-	-
114 Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.											
Greyeagle	0-3	0.6-2.0	.06-.12	7.9-8.4	-	Low	Low	Low	.32	1	8
	3-6	2.0-6.0	.04-.09	7.9-8.4	-	Low	Low	Low	.28	-	-

TABLE J - Physical and Chemical Properties of Soils

Map Unit/Soil	Depth	Permeability	AWC "/"	pH	Salinity	Shrink Swell	Corrosion Steel	Corrosion Concrete	Erosion Factors K	Erosion Factors T	Erosion Factors Wind Group
	6-8	2.0-6.0	.02-.09	7.9-8.4	-	Low	Low	Low	.20	-	-
	8-24	-	-	-	-	-	-	-	-	-	-
	24-60	6.0-20.0	.02-.06	7.9-8.4	-	Low	Low	Low	.17	-	-
Arizo	0-4	>6.0	.05-.07	7.9-8.4	-	Low	Low	Low	.10	5	4
	4-60	>20.0	.04-.06	7.9-8.4	-	Low	Low	Low	.10	-	-
115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.											
Greyeagle	0-5	2.0-6.0	.05-.08	7.9-8.4	-	Low	Low	Low	.20	1	3
	5-14	2.0-6.0	.05-.08	7.9-8.4	-	Low	Low	Low	.24	-	-
	14-22	-	-	-	-	-	-	-	-	-	-
	22-60	0.2-0.6	.02-.08	7.9-8.4	-	Low	Low	Low	.24	-	-
Arizo	0-3	>6.0	.05-.07	7.9-8.4	-	Low	Low	Low	.10	5	4
	3-60	>20.0	.04-.06	7.9-8.4	-	Low	Low	Low	.10	-	-
116 Huntmont - Ferroburro - Rock outcrop association, 30-75 percent slopes.											
Huntmont	0.2	2.0-6.0	.08-.13	6.6-7.8	-	Low	Low	Low	.20	5	3
	2-27	2.0-6.0	.12-.15	6.6-7.8	-	Low	Low	Low	.24	-	-
	27-34	2.0-6.0	.06-.09	6.6-7.8	-	Low	Low	Low	.15	-	-
	34-63	0.6-2.0	.10-.16	6.6-7.8	-	Low	Low	Low	.28	-	-
	63	-	-	-	-	-	-	-	-	-	-
Ferroburro	0-6	2.0-6.0	.07-.13	6.6-7.8	-	Low	Low	Low	.24	1	3
	6-14	2.0-6.0	.07-.11	6.6-7.8	-	Low	Low	Low	.24	-	-
	14-20	-	-	-	-	-	-	-	-	-	-

TABLE J - Physical and Chemical Properties of Soils

Map Unit/Soil	Depth	Permeability	AWC "/"	pH	Salinity	Shrink Swell	Corrosion: Steel	Corrosion: Concrete	Erosion Factors: K	Erosion Factors: T	Erosion Factors: Wind Group
Rock Outcrop	-	-	-	-	-	-	-	-	-	-	-
117 Luckyrich - Ulida - Luckyrich variant association, 0 to 15 percent slopes.											
Luckyrich	0-30	2.0-6.0	.06-.13	7.4-8.4	-	Low	Low	Low	.28	3	3
	30-40	2.0-6.0	.06-.13	7.4-8.4	-	Low	Low	Low	.28	-	-
	40-60	-	-	-	-	-	-	-	-	-	-
Ulida	0-2	6.0-20	.04-.07	7.4-8.4	<2	Low	Low	Low	.20	1	2
	2-5	2.0-6.0	.09-.12	7.4-8.4	<2	Low	Low	Low	.24	-	-
	5-15	0.2-0.6	.09-.17	7.4-8.4	<2	Mod.	Low	Low	.24	-	-
	15-19	2.0-6.0	.07-.11	7.4-8.4	<2	Low	Low	Low	.24	-	-
	19-22	-	-	-	-	-	-	-	-	-	-
Luckyrich Variant	0-3	6.0-20.0	.05-.07	7.9-8.4	-	Low	Low	Low	.28	5	2
	3-25	2.0-6.0	.10-.13	7.9-8.4	<2	Low	Low	Low	.28	-	-
	25-60	2.0-6.0	.09-.12	7.9-8.4	<2	Low	Low	Low	.28	-	-
118 Mexispring - Luckyrich - Panamint association, 15 to 50 percent slopes.											
Mexispring	0-1	2.0-6.0	.03-.10	7.9-8.4	<2	Low	Low	Low	.28	1	3
	1-6	2.0-6.0	.03-.10	7.9-8.4	<2	Low	Low	Low	.28	-	-
	6-15	-	-	-	-	-	-	-	-	-	-
Luckyrich	0-40	2.0-6.0	.06-.13	7.4-8.4	-	Low	Low	Low	.28	3	3
	40-60	-	-	-	-	-	-	-	-	-	-
Panamint	0-2	2.0-6.0	.09-.15	7.9-8.4	-	Low	Low	Low	.28	2	3
	2-24	2.0-6.0	.07-.14	7.9-8.4	-	Low	Low	Low	.32	-	-
	24-60	-	-	-	-	-	-	-	-	-	-

TABLE J - Physical and Chemical Properties of Soils

Map Unit/Soil	Depth	Permeability	AWC "/"	pH	Salinity	Shrink Swell	Corrosion Steel	Corrosion Concrete	Erosion Factors K	Erosion Factors T	Erosion Factors Wind Group
119 - Mexispring - Ulida association, 30 to 50 percent slopes.											
Mexispring	0-4	2.0-6.0	.03-.10	7.9-8.4	<2	Low	Low	Low	.28	1	3
	4-6	2.0-6.0	.03-.10	7.9-8.4	<2	Low	Low	Low	.28	-	-
	6-10	-	-	-	-	-	-	-	-	-	-
Ulida	0-5	6.0-20	.04-.07	7.4-8.4	<2	Low	Low	Low	.20	1	2
	5-15	0.2-0.6	.09-.17	7.4-8.4	<2	Mod.	Low	Low	.24	-	-
	15-19	2.0-6.0	.07-.11	7.4-8.4	<2	Low	Low	Low	.24	-	-
	19-20	-	-	-	-	-	-	-	-	-	-
Panamint	0-3	2.0-6.0	.09-.16	7.9-8.4	-	Low	Low	Low	.32	2	3
	3-30	2.0-6.0	.09-.16	7.9-8.4	-	Low	Low	Low	.32	-	-
	30-60	-	-	-	-	-	-	-	-	-	-
120 Osobb Variant extremely gravelly very fine sandy loam, 2 to 5 percent slopes.											
Osobb Variant	0-3	2.0-6.0	.03-.05	7.4-8.4	-	Low	Low	Low	.32	1	3
	3-12	2.0-6.0	.03-.05	7.4-8.4	-	Low	Low	Low	.32	-	-
	12-16	-	-	-	-	-	-	-	-	-	-
	16-50	2.0-6.0	.02-.04	7.4-8.4	-	Low	Low	Low	.32	-	-
121 Playas	-	-	-	-	-	-	-	-	-	-	-
122 Riverwash - Arizo association, 0 to 5 percent slopes.											
Riverwash	-	-	-	-	-	-	-	-	-	-	-
Arizo	0.3	>6.0	.05-.07	7.9-8.4	-	Low	Low	Low	.10	5	4
	3-60	>20.0	.04-.06	7.9-8.4	-	Low	Low	Low	.10	-	-
123 Rock Outcrop	-	-	-	-	-	-	-	-	-	-	-

TABLE J - Physical and Chemical Properties of Soils

Map Unit/Soil	Depth	Permeability	AWC "/"	pH	Salinity	Shrink Swell	Corrosion Steel	Corrosion Concrete	Erosion Factors K	Erosion Factors T	Erosion Factors Wind Group
124 Rock Outcrop - Cryoborolls - Xeric Torriorthents, association, 30 to 75 percent slopes											
Rock Outcrop	-	-	-	-	-	-	-	-	-	-	-
Cryoborolls											
Xeric Torriorthents	The extreme variability of these soils requires onsite investigation.										
125 Rock outcrop - Ulida - Ferrobuirro complex, 15 to 75 percent slopes.											
Rock Outcrop	-	-	-	-	-	-	-	-	-	-	-
Ulida	0-6	6.0-20.0	.05-.07	7.4-8.4	-	Low	Low	Low	.20	1	2
	6-14	0.2-6.0	.09-.17	7.4-8.4	-	Mod.	Low	Low	.24	-	-
	14-18	2.0-6.0	.07-.11	7.4-8.4	-	Low	Low	Low	.24	-	-
	18-20	-	-	-	-	-	-	-	-	-	-
Furroburro	0-6	2.0-6.0	.07-.11	6.6-7.8	-	Low	Low	Low	.24	1	3
	6-14	2.0-6.0	.07-.11	6.6-7.8	-	Low	Low	Low	.24	-	-
	14-20	-	-	-	-	-	-	-	-	-	-
126 Salt flats	-	-	-	-	-	-	-	-	-	-	-
127 Theriot extremely gravelly loam, 5 to 30 percent slopes.											
Theriot	0-10	0.6-2.0	.03-.12	7.9-8.4	-	Low	Low	Low	.32	1	4L
	10	-	-	-	-	-	-	-	-	-	-

TABLE J - Physical and Chemical Properties of Soils

Map Unit/Soil	Depth	Permeability	AWC "/"	pH	Salinity	Shrink Swell	Corrosion Steel	Corrosion Concrete	Erosion Factors K	Erosion Factors T	Erosion Factors Wind Group
128 Theriot extremely cobbly loam, 30 to 75 percent slopes.											
0-6	0.6-2.0	.03-.12	7.9-8.4	-	-	Low	Low	Low	.32	1	4L
6	-	-	-	-	-	-	-	-	-	-	-
129 Torriothents, stony. The extreme variability of these soils requires onsite investigation.											
130 Tybo variant gravelly very fine sandy loam, 2 to 5 percent slopes.											
Tybo	0-2	0.6-2.0	.09-.13	7.9-8.4	-	Low	Low	Low	.32	1	3
Variant	2-10	0.6-2.0	.09-.17	7.9-8.4	-	Low	Low	Low	.32	-	-
	10-14	0.6-2.0	.07-.13	7.9-8.4	-	Low	Low	Low	.32	-	-
	14-25	-	-	-	-	-	-	-	-	-	-
	25-30	-	-	-	-	-	-	-	-	-	-
	30	-	-	-	-	-	-	-	-	-	-
131 Ulida - Mexispring complex, 50 to 85 percent slopes.											
Ulida	0-3	6.0-20.0	.04-.07	7.4-8.4	<2	Low	Low	Low	.02	1	2
	3-6	2.0-6.0	.09-.12	7.4-8.4	<2	Low	Low	Low	.24	-	-
	6-15	0.2-0.6	.09-.17	7.4-8.4	<2	Mod	Low	Low	.24	-	-
	15-20	2.0-6.0	.07-.11	7.4-8.4	<2	Low	Low	Low	.24	-	-
	20	-	-	-	-	-	-	-	-	-	-
Mexispring	0-10	2.0-6.0	.07-.10	7.9-8.4	<2	Low	Low	Low	.28	1	3
	10-12	-	-	-	-	-	-	-	-	-	-
132 Upspring - Blacktop association, 15 to 50 percent slopes.											
Upspring	0-6	2.0-6.0	.05-.13	7.9-8.4	<2	Low	Low	Low	.28	1	<4
	6-8	2.0-6.0	.05-.09	7.9-8.4							

TABLE J - Physical and Chemical Properties of Soils

Map Unit/Soil	Depth	Permeability	AWC "/"	pH	Salinity	Shrink Swell	Corrosion Steel	Corrosion Concrete	Erosion Factors K	Erosion Factors T	Erosion Factors Wind Group
	8	-	-	-	-	-	-	-	-	-	-
Blacktop	0-7	0.6-2.0	.03-.10	7.4-8.4	<4	Low	Low	Low	.20	1	3
	7	-	-	-	-	-	-	-	-	-	-
133 Waucoba stony loam, 30 to 85 percent slopes.											
Waucoba	0-3	0.6-2.0	.11-.16	6.6-7.8	-	Low	Low	Low	.32	1	5
	3-9	0.6-2.0	.11-.16	6.6-7.8	-	Low	Low	Low	.32	-	-
	9-19	0.2-0.6	.10-.19	7.4-8.4	<2	Mod	Low	Low	.24	-	-
	19	-	-	-	-	-	-	-	-	-	-
134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes.											
Waucoba	0-2	2.0-6.0	.05-.09	7.9-8.4	-	Low	Low	Low	.20	2	3
	2-22	0.6-2.0	.06-.12	7.9-8.4	-	Low	Low	Low	.24	-	-
	22-23	-	-	-	-	-	-	-	-	-	-
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.											
Yellowrock	0-3	6.0-20.0	.03-.07	7.9-8.4	<4	Low	Low	Low	.24	5	2
	3-60	6.0-20.0	.04-.09	7.9-8.4	<2	Low	Low	Low	.24	5	2
136 Yellowrock loamy fine sand, 2 to 9 percent slopes.											
Yellowrock	6-7	6.0-20.0	.04-.11	7.9-8.4	<4	Low	Low	Low	.28	5	2
	7-60	6.0-20.0	.04-.09	7.9-8.4	<2	Low	Low	Low	.24	-	-
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.											
Yellowrock	0-4	6.0-20.0	.03-.07	7.9-8.4	<4	Low	Low	Low	.24	5	2
	4-60	6.0-20.0	.04-.09	7.9-8.4	<2	Low	Low	Low	.24	-	-

TABLE J - Physical and Chemical Properties of Soils

Map Unit/Soil	Depth	Permeability	AWC "/"	pH	Salinity	Shrink Swell	Corrosion Steel	Corrosion Concrete	Erosion Factors K	Erosion Factors T	Erosion Factors Wind Group
Bluewing	0-11	6.0-20	.04-.06	7.9-8.4	<2	Low	Low	Low	.15	5	4
	11-60	>20.0	.04-.06	7.9-8.4	<4	Low	Low	Low	.10	-	-
Arizo	0-4	>6.0	.05-.07	7.9-8.4	-	Low	Low	Low	.10	5	4
	4-60	>20.0	.04-.06	7.9-8.4	-	Low	Low	Low	.10	-	-
138 Yellowrock - Riverwash comples, 2 to 5 percent slopes.											
Yellowrock	0-8	6.0-20.0	.04-.07	7.9-8.4	<4	Low	Low	Low	.20	5	2
	8-60	6.0-20.0	.04-.09	7.9-8.4	<2	Low	Low	Low	.24	-	-
Riverwash	-	-	-	-	-	-	-	-	-	-	-
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.											
Yellowrock	0-4	6.0-20.0	.03-.07	7.9-8.4	<4	Low	Low	Low	.24	5	2
	4-60	6.0-20.0	.04-.09	7.9-8.4	<2	Low	Low	Low	.24	-	-
Yermo	0-3	0.6-2.0	.08-.12	7.9-8.4	<2	Low	Low	Low	.28	5	4L
	3-60	2.0-6.0	.08-.12	7.9-8.4	<2	Low	Low	Low	.24	-	-
Arizo	0-4	>6.0	.05-.07	7.9-8.4	-	Low	Low	Low	.10	5	4
	4-60	>20.0	.04-.06	7.9-8.4	-	Low	Low	Low	.10	-	-
140 Yellowrock Variant loam, 0 to 2 percent slopes.											
Yellowrock Variant	0-8	0.6-2.0	.01-.03	7.9-9.0	>16	Low	High	High	.32	5	4L
	8-18	2.0-6.0	.03-.10	7.9-8.4	>16	Low	High	High	.32	-	-
	18-31	0.6-2.0	.03-.10	7.9-8.4	>16	Low	High	High	.55	-	-
	31-43	2.0-6.0	.05-.14	7.9-9.0	>16	Low	High	High	.37	-	-
	43-60	2.0-6.0	.01-.08	7.9-8.4	>16	Low	High	High	.32	-	-

TABLE K - Soil and Water Features

Map Unit/Soil	Hydrologic Group	Flooding			High Water Table			Bedrock		Cemented Pan	
		Freq.	Duration	Month	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
101 Arizo complex, 5 to 15 percent slopes.											
Arizo	A	rare	v. brief	-	>6'	-	-	>60"	-	-	-
Arizo	A	common	v. brief	Jan-Mar	>6'	-	-	>60"	-	-	-
102 Arizo Variant very stony loam, 2 to 9 percent slopes.											
Arizo Variant	C	none	-	-	>6'	-	-	>60"	-	-	-
103 Badland	-	-	-	-	-	-	-	-	-	-	-
104 Beveridge very gravelly sandy loam, 30 to 75 percent slopes.											
Beveridge	D	none	-	-	>6'	-	-	10-20"	hard	-	-
105 Blacktop - Rock outcrop complex, 30 to 75 percent slopes.											
Blacktop	D	none	-	-	>6'	-	-	4-14	hard	-	-
Rock outcrop	-	-	-	-	-	-	-	-	-	-	-
106 Bunkerhill loamy fine sand, 0 to 2 percent slopes.											
Bunkerhill	C	common	long	Nov-Feb	+.5-10A	apparent	Nov-May	>60"	-	10-20	thin
107 Cinder land	-	-	-	-	-	-	-	-	-	-	-
108 Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.											
Cliffdown	B	none	-	-	>6'	-	-	>60"	-	-	-

TABLE K - Soil and Water Features

Map Unit/Soil	Hydrologic Group	Flooding			High Water Table			Bedrock		Cemented Pan	
		Freq.	Duration	Month	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
Yermo	B	none	-	-	>6'	-	-	>60"	-	-	-
Arizo	A	common	v. brief	Jan-Mar	>6'	-	-	>60"	-	-	-
109 Cliffdown Variant very cobbly loam, 30 to 50 percent slopes.											
Cliffdown Variant	B	none	-	-	>6'	-	-	>40"	soft	-	-
110 Dune land	-	-	-	-	-	-	-	-	-	-	-
111 Dune land - Bunkerhill association, hummocky, 0 to 9 percent slopes.											
Dune land	-	-	-	-	-	-	-	-	-	-	-
Bunkerhill	C	common	long	Nov-Feb	+.5-10'	apparent	Nov-May	>60"	-	10-20	thin
112 Ferroburro - Rock outcrop complex, 50 to 75 percent slopes.											
Ferroburro	D	none	-	-	>6'	-	-	10-20"	soft	-	-
Rock outcrop	-	-	-	-	-	-	-	-	-	-	-
Mexispring	D	none	-	-	>6'	-	-	4-14"	soft	-	-
113 Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.											
Ferroburro Variant	B	none	-	-	>6'	-	-	20-40"	soft	-	-
114 Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.											
Greyeagle	D	rare	-	-	>6'	-	-	>60"	-	-	-

TABLE K - Soil and Water Features

Map Unit/Soil	Hydrologic Group	Flooding			High Water Table			Bedrock		Cemented Pan	
		Freq.	Duration	Month	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
Arizo	A	common	v. brief	Jan-Mar	>6'	-	-	>60"	-	-	-
115 Greyeagle Variant - Arizo association, 5 to 15 percent slopes.											
Greyeagle Variant	D	none	-	-	>6'	-	-	>60"	-	10-20"	thin
Arizo	A	common	v. brief	Jan-Mar	>6'	-	-	>60"	-	-	-
116 Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.											
Huntmount	B	none	-	-	>6'	-	-	>60"	soft	-	-
Ferroburro	D	none	-	-	>6'	-	-	10-20"	soft	-	-
Rock outcrop	-	-	-	-	-	-	-	-	-	-	-
117 Luckyrich - Ulida - Luckyrich Variant association, 0 to 15 percent slopes.											
Luckyrich	B	none	-	-	>6'	-	-	40-60"	soft	-	-
Ulida	D	none	-	-	>6'	-	-	10-20"	soft	-	-
Luckyrich Variant	B	rare	-	-	>6'	-	-	>60"	-	-	-
118 Mexispring - Luckyrich - Panamint association, 15 to 50 percent slopes.											
Mexispring	D	none	-	-	>6'	-	-	4-14"	soft	-	-
Luckyrich	B	none	-	-	>6'	-	-	40-60"	soft	-	-
Panamint	B	none	-	-	>6'	-	-	20-40"	soft	-	-

TABLE K - Soil and Water Features

Map Unit/Soil	Hydrologic Group	Flooding Freq.	Flooding Duration	Flooding Month	High Water Table Depth	High Water Table Kind	High Water Table Months	Bedrock Depth	Bedrock Hardness	Cemented Pan Depth	Cemented Pan Hardness
119 Mexispring - Ulida association, 30 to 50 percent slopes.											
Mexispring	D	none	-	-	>6'	-	-	4-14"	soft	-	-
Ulida	D	none	-	-	<6'	-	-	10-20"	soft	-	-
Panamint	B	none	-	-	>6'	-	-	20-40"	soft	-	-
120 Osobb Variant extremely gravelly very fine sandy loam, 2 to 5 percent slopes.											
Osobb Variant	D	none	-	-	>6'	-	-	>60"	-	10-20	thin
121 Playas	-	-		-	-	-	-	-	-	-	-
122 Riverwash - Arizo association, 0 to 5 percent slopes.											
Riverwash	-	-	-	-	-	-	-	-	-	-	-
Arizo	A	common	v. brief	Feb-Apr	>6'	-	-	>60"	-	-	-
123 Rock outcrop	-	-	-	-	-	-	-	-	-	-	-
124 Rock outcrop - Cryoborolls - Xeric Torriorthents association, 30 to 75 percent slopes.											
Rock outcrop	-	-	-	-	-	-	-	-	-	-	-
Cryoborolls		The extreme variability of these soils requies on site investigation.									
Xeric Torriorthents											
125 Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slopes.											
Rock outcrop	-	-	-	-	-	-	-	-	-	-	-

TABLE K - Soil and Water Features

	Hydrologic	Flooding			High Water Table			Bedrock		Cemented Pan	
Map Unit/Soil	Group	Freq.	Duration	Month	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
Ulida	D	none	-	-	>6'	-	-	10-20"	soft	-	-
Ferroburro	D	none	-	-	>6'	-	-	10-20"	soft	-	-
126 Salt Flats	-	-	-	-	-	-	-	-	-	-	-
127 Theriot extremely gravelly loam, 5 to 30 percent slopes.											
Theriot	D	none	-	-	>6'	-	-	5-20	hard	-	-
128 Theriot extremely cobbly loam, 30 to 75 percent slopes.											
Theriot	D	none	-	-	>6'	-	-	5-20	hard	-	-
129 Torriorthents, stony. The extreme variability of these soils requires on site investigation.											
130 Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slopes.											
Tybo Variant	D	none	-	-	>6'	-	-	25-40	soft	8-17	thick
131 Ulida - Mexispring complex, 50 to 85 percent slopes.											
Ulida	D	none	-	-	>6'	-	-	40-20"	soft	-	-
Mexispring	D	none	-	-	>6'	-	-	4-14"	soft	-	-
132 Upspring - Blacktop association, 5 to 50 percent slopes.											
Upspring	D	none	-	-	>6'	-	-	4-14"	hard	-	-
Blacktop	D	none	-	-	>6'	-	-	4-14"	hard	-	-

TABLE K - Soil and Water Features

Map Unit/Soil	Hydrologic Group	Flooding			High Water Table			Bedrock		Cemented Pan	
		Freq.	Duration	Month	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
133 Waucoba stony loam, 30 to 85 percent slopes.											
Waucoba	D	none	-	-	>6'	-	-	14-20"	hard	-	-
134 Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes.											
Waucoba Variant	C	none	-	-	>6'	-	-	20-40"	soft	-	-
135 Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.											
Yellowrock	A	occasional	v. brief	Nov-Feb	>6'	-	-	>60"	-	-	-
136 Yellowrock loamy fine sand, 2 to 9 percent slopes.											
Yellorock	A	none	-	-	>6'	-	-	>60"	-	-	-
137 Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.											
Yellowrock	A	none	-	-	>6'	-	-	>60"	-	-	-
Bluewing	A	occasional	v. brief	Jan-Apr	>6'	-	-	>60"	-	-	-
Arizo	A	common	v. brief	Feb-Apr	>6'	-	-	>60"	-	-	-
138 Yellowrock - Riverwash complex, 2 to 5 percent slopes.											
Yellowrock	A	occasional	v. brief	Nov-Feb	>6'	-	-	>60"	-	-	-
Riverwash	-	-	-	-	-	-	-	-	-	-	-

TABLE K - Soil and Water Features

Map Unit/Soil	Hydrologic Group	Flooding			High Water Table			Bedrock		Cemented Pan	
		Freq.	Duration	Month	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
139 Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.											
Yellowrock	A	none	-	-	>6'	-	-	>60"	-	-	-
Yermo	B	none	-	-	>6'	-	-	>60"	-	-	-
Arizo	A	common	v. brief	Jan-Mar	>6'	-	-	>60"	-	-	-
140 Yellowrock Variant loam, 0 to 2 percent slopes											
Yellowrock Variant	C	frequent	brief	Jan-Mar	2-4'	apparent	Jan-Mar	>60"	-	-	-

TABLE J2 SOIL PHYSICAL LABORATORY ANALYSES

Series	Horizon	Depth (in.)	Particle Size Distribution Percent by Weight: whole soil: rock >7.5cm	frags. 2mm-7.5cm	fine fraction (<2mm): sand (2-.05)	silt (05.-.002)	clay (<.002)	USDA Texture Class	Wet Sieve Sands - Percent by Weight; (<2mm): v.cos (2-1)	cos. (1-.5)	med. (.5-.25)	fine (.25-.1)	v. fine (.1-.05)
Arizo	A1	0-3	35	55	77.0	19.8	3.2	STV-LFS	2.7	4.8	11.2	39.4	18.9
	C	3-60	10	65	91.7	6.8	1.6	GRV-LCOS	25.5	20.0	18.9	21.2	6.1
Bunkerhill	A11sa	0-4	-	-	80.0	9.5	10.5	LFS	0.4	2.2	6.8	49.9	20.7
	A12sa	4-9	-	-	74.7	15.1	10.4	LFS	1.7	3.4	7.9	31.7	30.0
	C1sa	9-15	-	-	45.2	41.5	13.4	L	0.7	1.5	3.3	19.6	20.1
	C2si	15-17	-	-	55.1	33.5	11.4	SL	1.6	2.2	2.6	23.8	24.9
	C3	17-28	-	-	32.4	43.8	23.8	SIL	0.3	0.6	0.6	12.5	18.4
	A1cab & C4b	28-50	-	-	32.5	47.7	19.8	L	0	0.1	0.1	14.6	17.7
Cliffdown Variant	A11	0-5	25	35	42.5	47.7	9.9	CBV-L	2.4	2.8	3.9	18.4	15.0
	A12	5-18	10	20	41.8	46.9	11.5	GR-L	3.8	3.8	4.3	16.4	13.5
	C1ca	18-46	40	25	52.0	41.7	6.4	CBV-SL	6.9	7.2	6.9	18.4	12.6
	C2ca	46-60	50	10	70.9	18.0	11.1	STV-SL	12.5	18.7	17.4	15.8	6.5
Ferroburro	A11	0-2	0	35	73.9	16.0	10.1	GR-SL	13.8	13.9	16.2	21.8	8.2
	A12	2-6	0	35	73.6	13.9	12.5	GR-SL	12.6	13.9	16.4	22.2	8.5
	C1	6-13	0	50	78.8	11.2	10.0	GR-SL	15.4	19.7	18.5	19.7	5.5
Ferroburro Variant	A1	0-8	15	15	57.8	37.2	5.0	ST-SL	4.9	8.4	12.6	26.6	5.3
	Cca	8-31	40	10	61.8	33.6	4.6	CB-FSL	4.1	7.5	10.7	30.5	9.0
Greyeagle	A11	0-3	27	75	41.9	37.3	20.9	STV-L	3.3	5.1	7.5	16.3	9.7
	A12	3-6	0	25	67.5	26.5	6.0	GR-SL	10.4	13.5	13.7	21.5	8.4
	C1ca	6-8	0	55	71.5	23.0	5.5	GRV-SL	17.0	14.7	12.7	19.8	7.3
Greyeagle Variant	A11	0-1	15	5	75.1	17.6	7.3	BY-SL	10.6	15.0	14.2	8.1	10.3
	A12	1-5	30	30	73.8	17.9	6.3	CBV-SL	10.2	13.8	13.3	7.6	10.1
	B2t	5-11	30	25	65.3	18.8	15.9	CBV-SL+	10.4	14.3	13.8	7.9	9.1
	B3tca	11-14	30	25	65.7	21.4	12.9	CBV-SL	11.6	15.6	14.1	8.0	9.7
	C1sica	14-22	55	0	76.2	15.6	8.2	BYV-LS	17.6	22.8	17.6	7.7	7.8

TABLE J2 SOIL PHYSICAL LABORATORY ANALYSES

Series	Horizon	Depth (in.)	Particle Size Distribution Percent by Weight: whole soil rock >7.5cm	whole soil frags. 2mm-7.5cm	fine fraction (<2mm) sand (2-.05)	silt (05.-.002)	clay (<.002)	USDA Texture Class	Wet Sieve Sands - Percent by Weight; (<2mm) v.cos (2-1)	cos. (1-.5)	med. (.5-.25)	fine (.25-.1)	v. fine (.1-.05)
Huntmount	A11	0-2	40	5	61.6	28.1	10.3	BY-FSL	4.4	7.0	9.5	23.2	17.5
	A12	2-27	10	10	56.2	29.5	14.3	FSL	3.9	6.5	10.1	21.0	14.7
	B1t	27-34	45	15	54.3	27.3	18.4	CBV-SL+	4.3	7.2	11.8	22.2	8.8
	B2t	34-43	15	25	49.8	29.8	20.4	CB-L	3.7	6.2	10.2	20.8	8.9
	C1	43-62	40	25	50.1	31.3	18.6	ST-L	4.7	7.0	9.2	20.0	9.2
Luckyrich Variant	A11	0-3	-	10	83.6	14.7	1.7	LCOS	14.4	14.5	10.7	28.3	15.7
	A12	3-16	-	10	52.7	28.6	18.7	SL	4.1	6.5	6.6	20.3	17.2
	C1	16-25	-	10	66.4	21.5	12.1	SL	7.9	12.5	10.2	23.8	12.0
	C2	25-60	-	10	68.1	22.2	9.6	SL	9.6	16.9	13.6	20.4	7.6
Panamint	A11	0-2	42	10	72.3	15.5	12.2	CB-VFSL	5.5	7.7	9.8	5.6	10.0
	A12	2-6	-	15	68.1	18.6	13.3	VFSL	3.3	5.5	7.7	4.8	8.4
	B2	6-18	-	20	65.1	20.4	14.5	GR-FSL	5.3	7.5	11.8	6.7	10.3
	C1	18-24	-	35	72.2	14.6	13.2	GR-FSL	5.0	11.3	19.1	9.3	11.9
Ulida	A11	0-2	-	10	78.3	15.8	5.9	LCOS	15.6	20.8	15.1	18.1	8.7
	A12	2-5	-	10	69.2	15.2	15.5	SL	10.5	18.7	14.9	17.0	8.1
	B2t	5-15	-	15	63.4	15.5	21.1	SCL	8.9	17.0	14.3	16.2	7.0
	C1	15-19	-	40	69.9	16.7	13.4	GR-SL	9.9	20.4	17.8	16.5	5.3
Upspring	A11	0-1	40	60	51.3	34.1	14.6	STV-L	9.7	7.5	7.0	16.7	10.4
	A12	1-6	40	60	71.9	16.6	11.5	STV-SL	14.7	19.2	14.2	16.9	6.9
	Cca	6-8	15	65	77.4	13.2	9.4	GRV-SL	12.7	22.4	18.3	18.1	5.9
Waucoba Variant	A1	0-2	66	40	58.6	31.3	10.1	CBX-FSL	5.5	7.7	9.8	5.6	10.0
	B1t	2-8	66	15	49.0	37.7	13.3	CBV-L	3.3	5.5	7.7	4.8	8.4
	B2tca	8-15	55	15	54.1	31.5	14.4	CBV-SL	5.3	7.5	11.8	6.7	10.3
	B3t	15-22	50	15	66.4	17.3	16.3	CBV-SL+	5.0	11.3	19.1	9.3	11.9

TABLE J2 SOIL PHYSICAL LABORATORY ANALYSES

Series	Horizon	Depth (in.)	Particle Size Distribution Percent by Weight: whole soil: rock >7.5cm	whole soil: frags. 2mm-7.5cm	fine fraction (2<mm): sand (2-.05)	fine fraction (2<mm): silt (05.-.002)	fine fraction (2<mm): clay (<.002)	USDA Texture Class	Wet sieve Sands - Percent by Weight; (<2mm): v.cos (2-1)	cos. (1-.5)	med. (.5-.25)	fine (.25-.1)	v. fine (.1-.05)
Yellowrock	A11sa	0-2	-	-	39.7	32.0	28.4	L	3.5	5.2	6.6	16.0	8.4
Variant	A12	2-5	-	-	32.1	46.8	21.2	L	4.3	6.2	7.4	4.5	9.7
	C1	5-14	-	40	65.0	24.6	10.5	GR-FSL	9.1	11.7	12.4	21.9	9.9
	C2	14-18	-	40	58.8	28.1	13.1	GR-FSL	13.9	11.3	10.5	16.5	6.6
	IIA1sa cab	18-24	-	-	31.0	61.9	7.2	SIL	1.1	1.2	4.3	13.5	10.9
	IIC1b	24-28	-	-	35.0	60.6	4.6	SIL	1.0	1.6	3.5	17.5	11.4
	IIA1b	28-31	-	-	30.6	60.9	8.5	SIL	0.9	2.5	4.1	13.8	9.3
	IIIC1 cab	31-43	-	-	49.8	40.2	10.0	FSL	3.1	5.9	7.4	19.7	13.7
	IVC2b	43-60	-	50	66.6	28.3	5.0	GRV-SL	8.9	10.3	11.8	23.9	11.7

Classification

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to the latest literature available (28).

The system of classificaiton has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table Q, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in sol. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Orthent (Orth, meaning most common, plus ent, for Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Torriorthents (Torri, meaning aridic climate, plus orthent, the suborder of Entisols that are deemed most common).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great group; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceeding the name of the great group. The adjective Typic identifies for the subgroup that is thought to typify the great group. An example is Typic Torriorthents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed (calcareous), mesic Typic Torriorthents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Table Q

Classification Legend

Series	Series Number	Taxonomic Class	Acres
Arizo	1001	Sandy-skeletal, mixed, thermic Typic Torriorthents	51,470
Arizo Variant	1375	Loamy-skeletal, mixed, thermic Typic Haplargids	2,350
Beveridge	1612	Loamy-skeletal, carbonatic, frigid Lithic Torriorthents	12,970
Blacktop	1577	Loamy-skeletal, mixed (calcareous), mesic Lithic Torriorthents	23,990
Bluewing	1006	Sandy-skeletal, mixed, mesic Typic Torriorthents	3,360
Bunkerhill	1009	Coarse-loamy, mixed, hyperthermic, Typic Salorthids	13,455
Cliffdown	1002	Loamy-skeletal, mixed (calcareous), mesic Typic Torriorthents	4,735
Cliffdown Variant	1600	Loamy-skeletal, mixed (calcareous), mesic Xeric Torriorthents	200
Ferroburro	1609	Loamy, mixed, mesic, shallow Entic Haploxerolls	5,665

Classification Legend
(continued)

Ferroburro Variant	1601	Coarse-loamy, mixed (calcareous), mesic Xeric Torriorthents	600
Greyeagle	1376	Loamy-skeletal, mixed, thermic, shallow Typic Durorthids	2,630
Greyeagle Variant	1013	Loamy-skeletal, mixed, thermic, shallow Haplic Durargids	975
Huntmount	1607	Fine-loamy, mixed, mesic Typic Haploxeralfs	1,800
Luckyrich	1010	Coarse-loamy, mixed, nonacid, mesic Xeric Torriorthents	4,640
Luckyrich Variant	1011	Coarse-loamy, mixed, nonacid, mesic Typic Xerorthents	625
Mexispring	1606	Loamy-skeletal, mixed, nonacid, mesic, shallow Typic Torriorthents	7,555
Osobb Variant	1012	Loamy-skeletal, mixed, mesic, shallow Typic Durorthids	2,030
Panamint	1613	Coarse-loamy, mixed, mesic Typic Haploxerolls	3,140
Theriot	1611	Loamy-skeletal, carbonatic, mesic Lithic Torriorthents	89,135
Tybo Variant	1578	Loamy, mixed, mesic, shallow Typical Durorthids	260
Ulida	1610	Loamy, mixed, mesic, shallow Xeralfic Haplargids	4,635
Upspring	1576	Loamy-skeletal, mixed (calcareous), thermic Lithic Torriorthents	25,515
Waucoba	1603	Loamy-skeletal, mixed, mesic Lithic Haplargids	2,560
Waucoba Variant	1575	Loamy-skeletal, mixed, mesic Typic Haplargids	1,050
Yellowrock 1/	1000	Sandy, mixed, thermic Typic Torriorthents	33,450

Classification Legend
(continued)

Yellowrock Variant	1008	Coarse-loamy, mixed, hyperthermic Fluventic Haplustolls	1,600
Yermo 2/	1003	Loamy-skeletal, mixed (calcareous) thermic Typic Torriorthents	12,630

1/ The map unit 136 contains a taxadjunct to the Yellowrock series. As mapped in 136, Yellowrock soils have mean annual soil temperatures of 53 to 59°F.

2/ Yermo in the map unit 139 is a taxadjunct to the Yermo series. As mapped in 139, Yermo soils have a warmer (65 to 69°F) range in mean annual soil temperature than the typical.

Arizo Series (1001)

The Arizo series consists of very deep, somewhat excessively drained soils formed in mixed alluvium (Plate 40). Arizo soils are on alluvial fans and have slopes of 0 to 15 percent. Mean annual precipitation is about 5 inches and the mean annual air temperature is about 65°F.

Taxonomic Class: Sandy-skeletal, mixed, thermic Typic Torriorthents.

Typical Pedon: Arizo very stony loamy fine sand - on an alluvial fan at 1860 feet elevation (Colors are for dry soil unless otherwise stated). When described (8/76) the soil was dry throughout.

60% of the surface is covered with 2mm to 25cm rock fragments. 40% 2mm-7cm, 10% 7-25cm, 10% 25cm+.

A1 -- 0 to 3 inches; light brownish gray (10YR 6/2) very stony loamy fine sand, dark grayish brown (10YR 4/2) moist; weak, fine, medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; many very fine interstitial pores; 40 percent by volume gravel, 10 percent cobbles and 10 percent stones; strongly effervescent, moderately alkaline (pH 8.2); clear wavy boundary. (1 to 3 inches thick).

C -- 3 to 60 inches; light grayish brown (10YR 6/2) stratified very gravelly sand to cobbly loamy sand with lenses of gravelly sand, dark grayish brown (10YR 4/2) moist; single grained; loose, nonsticky, nonplastic; common very fine roots; many very fine interstitial pores, rock fragments, 50 percent by volume, 45 percent gravel, 5 percent cobbles; strongly effervescent with disseminated lime; moderately alkaline (pH 8.0).

Location: Inyo County, California, Saline Valley. NE 1/4 of NE 1/4 of Section 16, T. 13 S., R. 39 E., MDBM about 2 1/2 miles north of the road to the Upper Warm Springs.

Range in Characteristics: The soils are well to somewhat excessively drained. They are moderately alkaline and calcareous throughout the profile. In the 10 to 40 inch textural control section 2mm to 25cm rock fragments range from 35 to 70 percent by volume. Mean annual soil temperature is about 68°F. Usually 50 to 90 percent of the soil surface is covered with rock fragments ranging in size from 2mm to greater than 25cm. These soils are dry throughout from May through November.

Colors in the A horizon are predominanatly light brownish gray and very pale brown (10YR 7/3, 6/2). Textures range from loamy fine sand, loamy sand, and sandy loam with gravelly and very gravelly modifiers, to very cobbly or very stony loamy fine sand. The surface 1 to 3 inches is sometimes gravel free and is vesicular.

In the C horizon, the textures range are dominately very gravelly to very cobbly loamy sand; with thin strata of sand to loamy fine sand.

Plate 40. Arizo very gravelly loamy fine sand.

Competing Series: These are the Yellowrock soils that have less than 35 percent rock fragments in the control section.

Geographic Setting: Arizo soils are on alluvial fans. Slopes are 0 to 15 percent. The soils formed in alluvium of mixed sources. Elevations are 1200 to 4200 feet. The climate consists of hot dry summers with infrequent thunder showers of short duration, and cool moist winters. The mean annual precipitation is 4 to 6 inches.

Mean January air temperature is about 45°F mean July air temperature is about 90°F mean annual air temperature is about 65°F. Frost-free season is about 235 to 300 days.

Geographically Associated Soils: These are the Yellowrock, Cliffdown, and Yermo soils. Yellowrock average fewer than 35 percent rock fragments in the control section. Cliffdown have mesic soil temperatures. Cliffdown and Yermo have loamy skeletal control sections.

Drainage and Permeability: Excessively drained; slow runoff, very rapid permeability.

Use and Vegetation: Use mainly for wildlife habitat and recreation. The native vegetation is primarily creosote bush (*Larrea tridentata*). Some areas have widly scattered white bursage (*Ambrosia dumosa*), spiny hopsage (*Grayia spinosa*), desert holly (*Atriplex hymenlytra*), and perennial grasses.

Arizo Variant (1375)

The Arizo Variant series consists of very deep, well drained soils formed from mixed alluvium (Plate 41). Arizo Variant soils are on older alluvial fans and have slopes of 2 to 9 percent. Mean annual precipitation is about 5 inches and mean annual air temperature is about 63°F.

Taxonomic Class: Loamy-skeletal, mixed, thermic Typic Haplargids.

Typical Pedon: Arizo Variant very stony loam - on a gently sloping older alluvial fan under native vegetation at 2160 feet elevation (Colors are for dry soil unless otherwise noted.) When described (5/9/79) the soil was dry throughout.

Surface is littered by 60 percent gravel, 30 percent cobbles, and 5 percent stones.

A1 -- 0 to 2 inches; very pale brown (10YR 7/3) very stony loam, brown (10YR 5/3) moist; strong fine granular and moderate coarse platy structure, highly vesicular; soft, very friable, nonsticky, nonplastic; common very fine roots; common fine, vesicular pores; 2 - 7mm rock fragments, 60 percent by volume; 7 - 20cm, 30 percent; 25cm+, 5 percent; strongly effervescent with disseminated lime; moderately alkaline (pH 8.1); abrupt wavy boundary. (1 to 3 inches thick)

B2tca -- 2 to 5 inches; pale brown and dark yellowish brown (10YR 6/3, 4/4) very stony clay loam, yellowish brown and dark yellowish brown (10YR 4/4, 3/4) moist; strong very fine subangular blocky structure, highly vesicular; hard, friable, slightly sticky and slightly plastic; few very fine roots; common fine vesicular pores; 2mm-7cm rock fragments, 30 percent by volume; 20 percent 7-25cm, and 5 percent 25cm+; few moderately thick clay films lining pores and on ped faces; strongly effervescent with disseminated lime and lime as a few soft masses; moderately alkaline (pH 8.0); clear irregular boundary. (3 to 6 inches thick)

B3ca -- 5 to 7 inches; light gray (10YR 7/2) very gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine roots; few very fine interstitial pores; 2mm-7cm rock fragments, 40 percent by volume and 7-25cm, 5 percent; violently effervescent with segregated lime as coatings on rock fragments; moderately alkaline (pH 8.0); clear wavy boundary. (0 to 4 inches thick)

C1 -- 7 to 18 inches; light gray (10YR 7/2) extremely gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky, and nonplastic; 2mm-7cm rock fragments, 50 percent by volume; 10 percent 7-25cm, and 1 percent 25cm+; few very fine interstitial pores; violently effervescent with segregated lime as coatings on rock fragments; moderately alkaline (pH 8.0); abrupt wavy boundary. (0 to 10 inches thick)

IIC2 -- 18 to 26 inches; very pale brown (10YR 7/3) extremely gravelly coarse sandy loam, moderately stratified with few thin lenses of gravel and sand, brown (10YR 5/3) moist; massive; hard, friable, nonsticky, nonplastic; few very fine roots; few very fine and fine interstitial pores; 2mm-7cm rock fragments, 70 percent by volume and 1 percent 7cm-25cm+; violently effervescent with 1mm thick lime coatings under rock fragments; moderately alkaline (pH 8.0). (2 to 30 inches thick)

IIC3 -- 26 to 60 inches; very pale brown (10YR 7/3) extremely gravelly loamy coarse sand, brown (10YR 5/3) moist; massive; very soft, very friable, nonsticky and nonplastic; common fine and medium interstitial pores; 70 percent by volume 2mm-7cm rock fragments, 10 percent 7-25cm, and 10 percent 25cm+; violently effervescent with disseminated lime and coatings on rock fragments; moderately alkaline (pH 8.0).

Location: Inyo County, California, Saline Valley, SE1/4 of NW1/4 of Section 3, T. 13 S., R. 39 E., MDBM. About 1 mile north of Upper Warm Springs just west of the Saline-Eureka corridor road.

Plate 41. Arizo Variant very stony loam.

Range in Characteristics: The soil is moderately to strongly alkaline and slightly to violently effervescent throughout. Rock fragments comprise 35 to 55 percent of the argillic horizon, and usually range from 35 to 90 percent in C horizons. Mean annual soil temperature is about 65°F. 35 to 90 percent of the surface is covered with rock fragments ranging in size from 2mm to 25cm+. These soils are dry from June through November.

The A horizon ranges in color from white and, light brownish gray to very pale brown (10YR 8/2, 7/2, 6/2, 6/3). Texture is very stony loam, clay averages 15 to 20 percent.

The B2t horizon is characterized by the accumulation of clays and carbonates. Colors range from white to dark yellowish brown (10YR 8/2, 6/3, 5/4, 4/4). Texture is very stony clay loam. In most pedons, a transitional B3 horizon occurs with colors similar to the B2t with very gravelly sandy loam textures. Clay averages 18 to 30 percent.

The C horizon consists of stratified alluvium. Colors range from light gray to light yellowish brown (10YR 7/2, 7/3, 6/4). Textures in the upper partrange from very gravelly and very cobbly sandy loam to extremely gravelly sandy loam, coarse sandy loam, and in the lower part, very gravelly to extremely gravelly loamy coarse sand.

Competing Series: These are the Ulida, Waucoba, and Waucoba Variant. Ulida and Waucoba are shallow to bedrock. Waucoba Variant are moderately deep to bedrock.

Geographic Setting: Arizo Variant soils are on older alluvial fans. Slopes are 2 to 9 percent. The soils formed from mixed alluvium, primarily of basaltic origin. Elevations are 2,000 to 4,200 feet. The climate consists of hot, dry summers, with infrequent thunder showers of short duration; and cool, moist winters. The mean annual precipitation is 5 to 8 inches.

Mean January air temperature is about 45°F; mean July air temperature is about 85°F; mean annual air temperature is about 63°F. Frost-free season is 235 to 300 days.

Geographically Associated Soils: These are the Arizo series which have a sandy-skeletal control section and lack the argillic horizon.

Drainage and Permeability: Well drained, medium runoff, moderate permeability in the surface, moderately slow in the subsoil, and rapid in the substratum.

Use and Vegetation: Used mainly for wildlife habitat, and recreation. The native vegetation consists primarily of tidestromis (Tidestromia oblongifolia), creosote bush (Larrea tridentata),and desert holly (Atriplex hymenelytra).

Beveridge Series (1612)

The Beveridge series consists of shallow somewhat excessively drained soils developed from sedimentary rocks. Beveridge soils are on hills and mountains and have slopes of 5 to 75 percent. Elevations are 8,000 to 11,000 feet. The mean annual air temperature is about 40°F.

Taxonomic Class: Loamy-skeletal, carbonatic, frigid Lithic Torriorthents.

Typical Pedon: Beveridge very gravelly sandy loam - on a moderately steep, convex mountain slope, under low sagebrush, and indian rice grass, at 8700 feet elevation. (Colors are for dry soil unless otherwise noted). When described (6/5/79) the soil was moist between 10 and 19 inches.

Surface littered with fissile shale fragments; 40 percent 2mm to 7cm and 2 percent 7 to 25cm.

A1 -- 0 to 3 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine vesicular and interstitial pores; 40 percent by volume 2mm to 7cm and 2 percent to 7 to 25cm fissile limestone fragments; slightly effervescent with disseminated lime violently effervescent on rock fragments, moderately alkaline (pH 8.0); clear loamy boundary. (2 to 3 inches thick)

C1 -- 3 to 10 inches; pale brown (10YR 6/3) very gravelly light loam, dark brown (10YR 4/3) moist; weak fine subangular blocky stucture; soft, very friable, nonsticky and slightly plastic; many fine and very fine roots; common fine tubular and interstitial pores; 35 percent by volume 2mm to 5mm fissile limestone fragments; strongly effervescent with disseminated lime violently effervescent on rock fragments, moderately alkaline (pH 8.2); abrupt wavy boundary. (4 to 8 inches thick)

C2ca -- 10 to 19 inches; very pale brown (10YR 7/3) extremely cobbly loam, brown (10YR 5/3) moist, massive; slightly hard, very friable, nonsticky and slightly plastic; few fine and very fine roots; few very fine interstitial pores; 50 percent by volume 2mm-7mm limestone fragments and 30 percent 7-25cm by volume; violently effervescent with disseminated lime and lime as pendants on rock fragments, moderately alkaline (pH 8.2); clear wavy boundary. (4 to 9 inches thick)

R -- 19 inches; fractured, fissile, limestone and shale. No displacement or rotation of fragments. Roots penetrate some cracks.

Location: Inyo County, California, Inyo Mountains about 3/4 mile southeast of the Saline Valley Salt Tram line near the Daisy Canyon summit station; at about 36°38'N Lat. and 117°51'W Long.

Range in Characteristics: Depth to a lithic contact with calcareous shale or limestone ranges from 10 to 20 inches. Mean annual soil temperature ranges from 40 to 47°F. Summer soil temperatures range between 60 and 65°F. The soil is moderately alkaline and mildly to strongly effervescent throughout. Organic matter averages less than 1 percent. The soils are moist in some part from early October through December and May through June.

The A horizon ranges in color from grayish brown (10YR 5/2) to pale brown and very pale brown (10YR 6/3, 7/3). Moist values are usually 2 munsell color chips darker than dry. The upper 2 to 3 inches is usually weakly vesicular. Rock fragments consist of gravel and cobbles and range from 35 to 70 percent. Texture is very gravelly sandy loam. Clay averages 10 to 18 percent.

The C horizon has textures similar to the A and includes extremely cobbly loam. Colors range from pale brown to very pale brown (10YR 6/3,

7/3). Many pedons have a Cca horizon with lime as pendants on rock fragments. The bedrock is fractured, hard, calcareous shale and dolomite.

Competing Series: These are the Theriot series that have a mesic soil temperature regime.

Geographic Setting: Beveridge soils are on hills and mountains. Slopes are 5 to 75 percent. They developed in residuum from calcareous shale and other carbonate sedimentary rocks. Elevations are 8,000 to 11,000 feet. The climate consists of mild, dry summers with infrequent thundershowers of short durations; and cold, moist winters. Mean annual precipitation is 8 to 10 inches.

Mean January air temperature is about 30°F; mean July air temperature is about 70°F; and mean annual air temperature is aout 40°F. Frost-free season is 100 to 185 days.

Geographically Associated Soils: These are the competing Theriot series.

Drainage and Permeability: Somewhat excessively drained and have moderately rapid permeability. Runoff is medium to rapid.

Use and Vegetation: Used mainly for watershed, wildlife habitat, and recreation. The native vegetation consists primarily of low sagebrush (Artemisia nova), and indian ricegrass (Oryzopsis hymenoides).

Series Proposed: Inyo County, California; Saline Valley Soil Survey 1979.

Remarks: Named for the old mining town of Beveridge near where the typifying pedon was described.

Blacktop Series (1577)

The Blacktop series consists of shallow, somewhat excessively drained soils formed in residuum from extrusive igneous rocks. Blacktop soils are on hills, mountains, and plateaus and have slopes of 15 to 50 percent. Mean annual precipitation is about 7 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Loamy-skeletal, mixed (calcareous), mesic Lithic Torriorthents.

Typical Pedon: Blacktop very stony fine sandy loam - on a steep plateau escarpment under very widely scattered saltbush at 5200 feet. (Colors are for dry soil unless otherwise noted.) When described (10/76) the soil was dry throughout.

60 percent of the surface covered by rock fragments; 35 percent 2mm-7cm, 10 percent, 7-25cm, and 15 percent+ 25-30cm.

A11 -- 0 to 1 inch; light gray (10YR 7/2) very stony fine sandy loam, grayish brown (10YR 5/2) moist; moderate coarse platy structure; slightly hard, very friable, nonsticky and nonplstic; few fine roots; many fine vesicular pores; 2mm-7cm fragments, 35 percent by volume; 7-25cm, 10 percent and 15 percent 25-30cm; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (1 to 4 inches thick)

A12 -- 1 to 7 inches; light gray (10YR 7/2) very stony fine sandy loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, friable, nonsticky and nonplastic; common very fine interstitial pores; 2-5mm fragments, 35 percent by volume; 10 percent 7-25cm, and 15 percent 25-30cm; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (0 to 9 inches thick)

R -- 7 inches; hard basalt with few fractures, no displacement of fragments.

Location: Inyo County, California. In Saline Valley, about 3/4 mile due east of Black Top Mountain at 36°56'N Lat. and 117°43'W Long.

Range in Characteristics: Depth to a lithic contact with hard extrusive igneous rock ranges from 4 to 10 inches. The mean annual soil temperature is about 55°F. These soils are moderately alkaline and slightly to moderately calcareous throughout. These soils are dry throughout from May through November.

The A horizon ranges in texture from very gravelly sandy loam to very stony fine sandy loam. Rock fragments, range from 35 to 70 percent by volume. Rock fragments range from 35 to 80 percent by volume. Colors in the A horizon are light gray and very pale brown (10YR 7/2, 7/3).

Completing Series: These are the Beveridge, Theriot, Upspring, and Waucoba soils. Beveridge and Theriot are formed from carbonate rocks and have a carbonatic reaction class. Beveridge has frigid soil temperatures. Upspring has thermic soil temperatures. Waucoba is non calcareous throughout.

Geographic Setting: Blacktop soils are on plateaus, hills, and mountains. Slopes are 15 to 50 percent. The soils formed in residuum from extrusive igneous rocks. Elevations are 4200 to 6500 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration; and cool, moist winters. The mean annual precipitation is 6 to 8 inches.

Mean January air temperature is about 40°F; mean July air temperature is about 80°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 235 days.

Geographically Associated Soils: These are the Upspring (t) soils that have a thermic soil temperature regime.

Drainage and Permeability: Somewhat excessively drained, rapid runoff, moderate permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, and recreation. The native vegetation consists primarily of scattered saltbush (Atriplex confertifolia) and winterfat (Eurotia lanata).

Series Proposed: Inyo County, California 1979; Saline Valley soil survey.

Remarks: Named derived from Blacktop Mountain near where the typical pedon was described.

Bluewing Series (1006)

The Bluewing series consists of very deep, excessively drained soils formed from mixed alluvium (Plate 42). Bluewing soils are on alluvial fans and flood plains and have slopes of 0 to 15 percent. Mean annual precipitation is about 7 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Sandy-skeletal, mixed, mesic Typic Torriorthents.

Typical Pedon: Bluewing very gravelly loamy sand - on an alluvial fan of 9 percent slope under natural vegetation at an elevation of 5700 feet. (Colors are for dry soil unless otherwise noted.) When described (6/76) the soil was dry throughout.

The surface is littered with rock fragments, 30 percent 2mm to 7cm, and 1 percent 25 to 50cm.

A11 -- 0 to 1 inch; light yellowish brown (10YR 6/4) very gravelly loamy sand, brown (10YR 4/3) moist; moderate very fine granular structure; soft, very friable, non-sticky and nonplastic; common fine, and medium roots; many very fine tubular and interstitial pores; rock fragments, 2-70mm 30 percent by volume 5 perent 7-25cm and 1 percent 25-50cm; slightly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt smooth boundary. (1 to 4 inches thick)

A12 -- 1 to 11 inches; light yellowish brown (10YR 6/4) gravelly loamy sand, brown (10YR 4/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; new fine, medium and coarse roots; common fine interstitial pores; rock fragments, 2-70mm 15 percent by volume and 5 percent 7-25cm; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); clear wavy boundary. (6 to 25 inches thick)

C1ca -- 11 to 39 inches; light gray (10YR 7/2) very cobbly loamy sand, pale brown (10YR 6/3) moist; massive; hard, friable, nonsticky and nonplastic; few fine roots; common very fine interstitial pores; rock fragments 2-70mm, 15 percent by volume and 20 percent 7 to 10cm; violently effervescent with disseminated lime, moderately alkaline (pH 8.0), lime coats rock fragments; diffuse wavy boundary. (20 to 35 inches thick)

C2ca - 39 to 60 inches; light gray (10YR 7/2) very cobbly loamy sand, pale brown (10YR 6/3) moist; massive; hard, friable, nonsticky and nonplastic; common fine interstitial pores; rock fragments 2-70mm, 20 percent by volume and 25 percent 7 to 50cm; violently effervescent with disseminated lime and lime coating the rock fragments, moderately alkaline (pH 8.0).

Plate 42. Bluewing very gravelly loamy sand.

Location: Inyo County, California, Saline Valley. N 1/2 of NW 1/4 of Section 16, T. 11 S., R. 37 E., MDBM. About 10 feet west of the Saline Valley road.

Range in Charateristics: Mean annual soil temperature is about 55°F. Rock fragments range from 2mm to 60cm in diameter and average 35 to 40 percent in the textural control section. Clay averages less than 12 percent with sand averaging greater than 70 percent in the control section. Reaction is moderately to strongly alkaline throughout. These soils are dry throughout from June through November.

The A horizon ranges in color from light yellowish brown to pale brown (10YR 6/4, 6/3). Textures are very cobbly, very gravelly, and gravelly loamy sand.

The C horizon range in color from light brownish gray to light gray (10YR 6/2, 7/2). Lime occurs in disseminated form and also coats the rock fragments. Textures are very gravelly and very cobbly loamy sand.

Competing Series: These are the Arizo, Cliffdown, Luckyrich, Luckyrich Variant, Yellowrock, and Yermo Series. Arizo, Yellowrock, and Yermo are thermic. Cliffdown and Yermo are loamy skeletal. Luckyrich is coarse loamy. Luckyrich Variant has a xeric moisture regime and is coarse loamy. Yellowrock averages fewer than 35 percent rock fragments.

Geographic Setting: Bluewing soils are on flood plains and alluvial fans. Slopes are 0 to 15 percent. The soils formed in alluvium of mixed sources. Elevations are 4200 to 5500 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration, and cool, moist winters. The mean annaul precipitation is about 6 to 8 inches.

Mean January air temperature is about 40°F; mean July air temperature is about 80°F; mean annual air temperature is about 53°F. The frost-free season is about 185 to 200 days.

Geographically Associated Soils: These are the Arizo, Cliffdown and Yermo. Arizo and Yermo are thermic. Cliffdown and Yermo are loamy skeletal.

Drainage and Permeability: Excessively drained, slow to medium runoff, very rapid permeability.

Use and Vegetation: Used mainly for wildlife habitat and recreation. Native vegetation consists of big sagebrush (*Artemisia tridentata*), shadscale (*Atriplex confertifolia*), and menodora (*Menodora spinescens*).

Bunkerhill Series (1009)

The Bunkerhill series are shallow, somewhat poorly drained soils formed in mixed lacustrine alluvium. Bunkerhill soils occupy basin rim positions and have slopes of 0 to 2 percent. Mean annual precipitation is about 4 inches and mean annual air temperature is about 70°F.

Taxonomic Class: Coarse-loamy, mixed, hyperthermic Typic Salorthids.

Typical Pedon: Bunkerhill loamy fine sand - on a nearly level basin rim under pickleweed at 1129 feet elevation. (Colors are for dry soils unless otherwise noted.) When described (8/7) was slightly moist below 20 inches.

Surface has a 1cm brittle saline crust.

A11sa -- 0 to 4 inches; light brownish gray (10YR 6/2) loamy fine sand with stratifications and lenses of very fine sand and silt, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; has a few broken pieces of very hard, indurated, silica cemented laminations; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many fine vesicular and interstitial pores; strongly alkaline (pH 8.5); abupt smooth boundary. (3 to 5 inches thick)

A12sa -- 4 to 9 inches; grayish brown (10YR 5/2) loamy fine sand with thin lenses of silt and very fine sand, very dark grayish brown (10YR 3/2) moist; massive; has a few broken pieces of indurated silica cemented laminations; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular and interstitial pores; slightly effervescent with disseminated lime, strongly alkaline (pH 8.5); abrupt wavy boundary. (5 to 6 inches thick)

C1sa -- 9 to 15 inches; light brownish gray (10YR 6/2) loam with fine lenses of very fine sand and silt, dark grayish brown (10YR 4/2) moist; massive; has a few broken pieces of indurated silica cemented laminae; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine interstitial pores; slightly effervescent with disseminated lime, strongly alkaline (pH 8.5); abrupt wavy boundary. (6 to 9 inches thick)

C2si -- 15 to 17 inches; very hard and hard, brittle, discontinous laminar layers (5mm-1cm thick) of silica cemented sand grains with silt and very fine sand lenses between the laminae. The laminar layers will not slake when soaked in HCl. (1 to 2 inches thick)

C3 -- 17 to 28 inches; pale brown (10YR 6/3) silt loam with thin lenses of silt and very fine sand, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and coarse roots; few very fine interstitial pores; strongly effervescent with disseminated lime, moderately alkaline (pH 8.3); abrupt smooth boundary. (5 to 10 inches thick)

Alcab -- 28 to 30 inches; brown (10YR 5/3) loam with thin lenses of very fine sand and silt, dark brown (10YR 3/3) moist; massive; hard, friable, sticky and plastic; few fine roots; few very fine intersitital pores; strongly effervescent with lime as a few, fine, soft masses, moderately alkaline (pH 8.0); clear smooth boundary. (1 to 5 inches thick)

C4b -- 30 to 50 inches; brown (10YR 5/3) loam with lenses of silt and every fine sand, brown (10YR 4/3) moist; few, fine and medium, distinct (7.5YR 5/4) mottles; massive; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine interstitial pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0)

Location: S 1/2 of NE 1/4 of Section 35, T. 13 S., R. 38 E., MDBM. About 3 miles southwest of lower warm springs 50 yards east of the lake road.

Range in Characteristics: Depth to a discontinous 0.5cm to 1cm laminar layers of silica cemented sand grains, ranges from 10 to 20 inches. The mean annual soil temperature is about 72°F. The electrical conductivity of the surface ranges from 23 to 225 mmhos/cm. Reaction is strongly alkaline above the duripan and moderately alkaline below; in the 0 to 17 inch zone SAR averages 191 and esp averages 74. Mottles occur below 20 inches as few, fine to medium and distinct (7.5YR 5/4, 5/6). The top 15 inches of the soil are moist for more than 90 consecutive days following the winter solstice and are moist continually below the duripan due to capillary action from the water table less than 10 feet below. The soils are saturated above 40 inches for 30 to 60 days in most years. Water is ponded during winter storms.

The A horizon consists of strata of light brownish gray to grayish brown (10YR 6/2, 5/2) very fine sand, loamy fine sand, fine sandy loam, silt and silt loam.

The C2si horizon consists of discontinuous laminar layers of silica cemented sand grains, with lenses of very fine sand and silt between the layers. The C3 horizon consists of semiconsolidated light brownish gray to pale brown (10YR 6/2, 6/3) stratified loam to silt loam and very fine sand.

In most pedons, buried soils are present below the C3 horizon. These are evidenced by organic matter enriched layers (A horizon) underlain by the alluvial parent material from which they were formed.

Competing Series: There are no series in this taxonomic class in this survey area.

Geographic Setting: Bunkerhill soils occupy the basin rim. The soils formed from mixed lacustrine alluvium. Slopes are 0 to 2 percent. Elevations are 1010 to 1250 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration and cool, moist winters. The mean annual pecipitation is 4 to 5 inches.

Mean January air temperature is about 50°F; mean July air temperature is about 95°F, mean annual air temperature is about 70°F. Frost-free season is greater than 320 days.

Geographically Associated Soils: These are the Yellowrock (t) series that have a sandy textural class, lack the salichorizon and have a thermic temperature regime.

Drainage and Permeability: Somewhat poorly drained; very slow runoff; moderate permeability. The water table fluctuates between depths of 3 and 20 feet.

Use and Vegetation: Used mainly for wildlife habitat and recreation. Native vegetation consists primarily of pickleweed (Allenrolfea oxidentalis).

Series Proposed: Inyo County, California; Saline Valley soil survey 1979.

Remarks: Named after the Bunkerhill Mine.

Cliffdown Series (1002)

The Cliffdown series consist of very deep, somewhat excessively drained soils formed in alluvium from mixed sources (Plate 43). Cliffdown soils developed on alluvial fans and have slopes of 5 to 15 percent. Mean annual precipitation is about 6 inches and the mean annual air temperature is about 52°F.

Taxonomic Class: Loamy-skeletal, mixed (calcareous), mesic Typic Torriorthents.

Typical Pedon: Cliffdown very gravelly loam - on an alluvial fan of 9 percent slope under natural vegetation at about 5,000 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (7/78) the soil was dry throughout.

50 percent of the surface is paved with 2mm to 25cm fragments coated with desert varnish, and 1 percent 25 to 80cm stones.

A11 -- 0 to 2 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; weak, fine platy structure; soft, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; rock fragments, 30 percent by volume, 35 percent 2-70mm, 15 percent 7-25cm; slightly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt smooth boundary. (1 to 3 inches thick)

A12 -- 2 to 5 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak very fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine and very fine roots; common fine interstitial pores, rock fragments, 2-70mm, 10 percent by volume; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); clear wavy boundary. (2 to 6 inches thick)

C1ca -- 5 to 15 inches; very pale brown (10YR 7/3) very gravelly loam, brown (10YR 5/3) moist; weak very fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine interstitial pores, rock fragments 2-70mm, 25 percent by volume, 7-20cm, 10 percent, and 25-50cm 2 percent; strongly effervescent with disseminated lime and lime coating undersides of rock fragments, moderately alkaline (pH 8.0); clear wavy boundary. (7 to 12 inches thick)

C2ca -- 15 to 60 inches; very pale brown (10YR 7/3) very gravelly loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; rock fragments 2-70mm, 25 percent by volume, 7-20cm 10 percent; violently effervescent with disseminated lime and lime coating the undersides of rock fragments, moderately alkaline (pH 8.0).

Location: Inyo County, California, Saline Valley. SE 1/4 of NE 1/4 of Section 28, T. 11 S., R. 37 E., MDBM. About 50 feet west of Saline Valley Road.

Range in Characteristics: Mean annual soil temperature is about 57°F. Reaction is moderately alkaline throughout. Lime coats the undersides of rock fragments in the Cca horizon. The surface commonly has a 20 to 50 percent pavement of 2mm to 25cm rock fragments with up to 10 percent stones. The soils are dry throughout from June through November. The 10 to 40 inch textural control section averages 35 to 40 percent by volume 2mm to 50cm rock fragments and 10 to 18 percent clay.

Colors of the A horizon range from light brownish gray to pale brown (10YR 6/2, 6/3). Texture is very gravelly loam.

The C has colors ranging from light gray to very pale brown (10YR 7/2, 7/3, 7/4). Textures are very gravelly sandy loam, very gravelly loam, and some thin layers of gravelly loam.

Competing Series: These are the Arizo, Bluewing, Luckyrich, Luckyrich Variant, Yellowrock, and Yermo soils. Arizo is sandyskeletal and thermic. Bluewing is sandy-skeletal. Luckyrich and Luckyrich Variant are coarse-loamy. Yellowrock is sandy and thermic. Yermo is thermic.

Geographic Setting: Cliffdown soils are on alluvial fans. Slopes are 5 to 15 percent. The soils formed in mixed alluvium. Elevations are 4200-6000 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration, and cool moist winters. The mean annual precipitation is 6 to 8 inches.

Mean January air temperature is about 40°F; mean July air temperature is about 80°F mean annual air temperature is about 52°F. Frost-free season is about 185 to 200 days.

Geographically Associated Soils: These are the competing Arizo, Yermo and Yellowrock soils.

Plate 43 Cliffdown very gravelly loam.

Drainage and Permeability: Somewhat excessively drained, medium runoff, moderately rapid permeability.

Use and Vegetation: Used mainly for wildlife habitat and recreation. The native vegetation is primarily big sagebrush (Artemisia tridentata) and spiny hopsage (Grayia spinosa).

Cliffdown Variant (1600)

The Cliffdown Variant are very deep, well drained soils formed in residuum from weathered limestone and from colluvium derived from limestone (Plate 44). Cliffdown Variant soils are on hills and mountains and have slopes of 30 to 50 percent. Mean annual precipitation is about 9 inches and the mean annual temperature is about 53°F.

Taxonomic Class: Loamy-skeletal, mixed (calcareous), mesic Xeric Torriorthents.

Typical Pedon: Cliffdown Variant very cobbly loam - on a steep convex mountain slope under native vegetation at 6000 feet elevation. (Colors are for dry soils unless otherwise noted.) When described (5/76) the soil was moist between 6 and 30 inches.

35 percent of the surface was covered with rock fragments, 20 percent 2mm-7cm and 15 percent 7-25cm.

A11 -- 0 to 5 inches; yellowish brown (10YR 5/4) very cobbly loam, dark yellowish brown (10YR 4/4) moist; moderate medium platy and weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine and medium roots; common fine tubular pores; 2mm-7cm rock fragments, 20 perccent by volume, 7-25cm fragments, 15 percent; slightly effervescent with disseminated lime, moderately alkaline (pH 8.0); clear smooth boundary. (2 to 7 inches thick)

A12 -- 5 to 18 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine tubular pores; rock fragments 2mm-7cm, 10 percent by volume and 7-25cm, 5 percent; violently effervescent with disseminated lime, moderately alkaline (pH 8.2); clear wavy boundary. (20 to 15 inches thick)

C1ca -- 18 to 46 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium and fine roots; common fine tubular pores; rock fragments 2mm-7cm, 15 percent by volume, 7-25cm 15 percent, and 10 percent, 25-50cm; violently effervescent with disseminated lime and lime coating undersides of rock fragments, moderately alkaline (pH 8.2); gradual wavy boundary. (20 to 30 inches thick)

C2ca -- 46 to 60 inches, very pale brown (10YR 7/4) very stony sandy loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, nonsticky, nonplastic; rock fragments 2mm-7cm, 5 percent by volume 7-25cm 15 percent, and 25-50cm 20 percent; violently effervescent with disseminated lime and lime coating rock fragments, moderately alkaline (pH 8.2).

Location: Inyo County, California, Inyo Mountains. SE 1/4 of the NW 1/4 of Section 5, T. 11 S., R. 27 E., MDBM. About one mile south of Whipporwill flat on the west side of the Saline Valley Road.

Range in Characteristics: The mean annual soil temperature is about 55°F. Depth to a lithic contact with hard limestone is greater than 40 inches. The 10 to 40 inch textural control section averages 10 to 18 percent clay and 35 to 45 percent rock fragments. Reaction is moderately alkaline throughout. These soils are dry in all parts from July until November. The soil temperature is above 41°F from April through mid November.

The A horizon ranges in color from brown to yellowish brown (10YR 5/3, 5/4), moist color is dark yellowish brown (10YR 4/4). Textures range from gravelly loam to very cobbly loam. 2mm to 25cm rock fragments range from 15 to 40 percent.

The C1 horizon ranges in color from pale brown and light yellowish brown to brownish yellow (10YR 6/3, 6/4, 6/6). Textures are very cobbly sandy loam, and very gravelly sandy loam. Lime coats the undersides of rock fragments. 2mm to 50cm rock fragments range from 35 to 50 percent by volume. The C2 textures are very cobbly and very stony sandy loam.

Plate 44. Cliffdown Variant very cobbly loam.

Competing Series: These are the Ferroburro Variant and Panamint soils. Ferroburro Variant soils are 20 to 40 inches to rock. Panamint soils

have a cambic horizon, are moderately deep, and have a Xeric moisture regime.

Geographic Setting: Cliffdown Variant soils are on hills and mountains. Slopes are 30 to 50 percent. The soils formed in residuum from limestone and from colluvium derived from limestone. Elevations are 5500 to 7500 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration, and cool, moist winters. The mean annual precipitation is 8 to 10 inches, some as snow.

Mean January air temperature is about 35°F; mean July air temperature is about 75°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 200 days.

Geographically Associated Soils: These are the Waucoba Variant, Ferroburro Variant, and Waucoba soils. Ferroburro Variant soils are 20 to 40 inches to weathered limestone. Waucoba Variant are 20 to 40 inches to weathered metasedimentary rock and have an argillic horizon. Waucoba are shallow and have an argillic horizon.

Drainage and Permeability: Well drained, medium runoff, moderate permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, and recreation. The native vegetation consists primarily of singleneedle pinyon (*Pinus monophylla*), Utah juniper (*Juniperus osteosperma*), and big sagebrush (*Artemisia tridentata*).

Cryoborolls

The Cryoborolls, consists of shallow to moderately deep, well drained soils developed in residuum from granitic rocks. They are on hills and mountains and have slopes of 30 to 75 percent. Mean annual precipitation is about 9 inches and mean annual air temperature is about 40°F.

Representative Pedon: Cryoborolls gravelly loamy coarse sand - on a steep concave mountain slope, under native vegetation, at 9500 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (12/76) the soil was moist throughout. Soil to 8 inches was frozen.

A11 - 0 to 4 inches; brown (10YR 5/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist; weak thick platy structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many fine tubular and interstitial pores, few fine vesicular pores; 2-3mm angular granitic fragments, 15 percent by volume; neutral (pH 7.0); abrupt smooth boundary. (3 to 5 inches thick)

A12 -- 4 to 14 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; massive, slightly hard, friable, nonsticky

and nonplastic; common very fine and fine roots, few medium roots; common fine tubular and interstitial pores; 2-3mm angular granitic fragments, 20 percent by volume; neutral (pH 7.0); gradual wavy boundary. (9 to 12 inches thick)

A13 -- 14 to 23 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular and interstitial pores; 2-3mm angular granitic fragments, 15 percent by volume; slightly acid (pH 6.5); clear wavy boundary. (7 to 15 inches thick)

C1 -- 23 to 25 inches; light yellowish brown (10YR 6/4) gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; massive, hard, friable, nonsticky and nonplastic; few fine interstitial pores; 2-5mm angular granitic fragments, 20 percent by volume; slightly acid (pH 6.2); clear wavy boundary. (2 to 8 inches thick)

C2r -- 25 to 30 inches; weathered quartz monzonite, few fractures, no displacement, will slake in water.

Location: Inyo County, California. About 1 1/2 miles southeast of Keynot Peak in the Inyo Mountains at the head of the north fork of Beveridge Canyon at about 36°42'N Lat. and 117°58'W Long.

Range in Characteristsics: Depth to a lithic or paralithic contact with quartz monzonite from 10 to 40 inches. The mean annual soil temperature is about 42°F. Summer soil temperature at 20 inches ranges from 55 to 59°F. These soils are moist in some part for 45 days following the summer solstace. Reaction is neutral to slightly acid throughout. Rock fragments 2mm to 25cm in size range from 15 to 35 percent. Fragments 7cm to 25cm make up 0 to 10 percent.

Surface textures range from cobbly or gravelly loamy coarse sand to cobbly or gravelly sandy loam.

The C horizon when present consist of very highly weathered parent rock. Textures are gravelly sandy loam and gravelly coarse sandy loam, cobbly sandy loam, gravelly loamy sand, or cobbly loamy sand.

Competing Series: These are the Xeric Torriorthents which average more than 35 percent rock fragments in the control section, have an aridic moisture regime that borders on xeric, and a frigid soil temperature regime.

Geographic Setting: The Cryoborolls, are on hills and mountains. Slopes are 30 to 75 percent. Elevations are 8,000 to 11,000 feet. The climate consists of mild summers with occassional thunderstorms of short duration; and cold, moist winters. The mean annual precipitation is 8 to 10 inches.

Mean January air temperature is about 30°F; mean July air temperature is about 50°F; mean annual air temperature is about 40°F. Frost-free season is 100 to 185 days.

Geographically Associated Soils: These are the Ulida soils and the competing Xeric Torriorthents. Ulida soils are shallow, have a typic aridic moisture regime, and a mesic soil temperature regime.

Drainage and Permeability: Well drained, medium to rapid runoff, moderately rapid permeability.

Use and Vegetation: Use mainly for watershed, wildlife habitat, and recreation. The native vegetation is primarily big sagebrush (*Artemisia tridentata*), curl leaf (*Cercocarpus ledifolius*), single needle pinyon (*Pinus monophylla*), limber pine (*Pinus flexilis*), spiked fescue (*Hesperchloa kingii*), and june grass (*Koelaria christata*).

Ferroburro Series (1609)

The Ferroburro series consists of shallow, well drained soils formed in residuum from granitic rocks. Ferroburro soils are on hills and mountains and have slopes of 15 to 75 percent. Mean annual precipitation is about 9 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Loamy, mixed, mesic, shallow Entic Haploxerolls.

Typical Pedon: Ferroburro gravelly sandy loam - on a steep, convex mountain slope; under pinion pine, at 6800 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (9/76) the soil was moist between 10 and 13 inches.

O1 -- 1/2 to 0 inches; litter of pinyon pine needles and twigs.

A11 -- 0 to 2 inches; brown (10YR 5/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; common fine tubular and interstitial pores; 2-3mm fragments, 20 percent by volume; neutral (pH 7.0); clear smooth boundary. (2 to 3 inches thick)

A12 -- 2 to 6 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak very fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and common medium roots; common fine tubular and interstitial pores; 2-3mm fragments, 20 percent by volume; mildly alkaline (pH 7.5); clear irregular boundary. (4 to 8 inches thick)

C1 -- 6 to 14 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, yellowish brown (10YR 5/4) moist; massive; loose, nonsticky

and nonplastic; common very fine, fine and coarse roots; common fine tubular and interstitial pores; 30 percent by volume 2 to 3mm rock fragments; mildly alkaline (pH 7.5); clear irregular boundary. (4 to 9 inches thick)

C2r -- 14 to 21 inches; weathered granitic rock, slakes in water.

Location: Inyo County, California. About 2 1/2 miles northeast of Jackass Springs, along the Hunter Mountain Road; and about 3/4 mile west of the southwest boundary of Death Valley Monument. In an unsurveyed area 36°32'N and 117°33'W.

Range in Charateristics: Depth to a paralithic contact with weathered granitic rock ranges from 10 to 20 inches. The mean annual soil temperature is about 55°F. Reaction is neutral or mildly alkaline throughout. Clay content averages 10 to 18 percent in the textural control section. The soil is moist in some part of the moisture control section from October through June in most years. These soils are characteristically drier than the typical xeric moisture regime.

The A horizon ranges in color from grayish brown to brown (10YR 5/2, 5/3, 7.5YR 5/2). Moist colors are very dark grayish brown and dark brown (10YR 3/2, 3/3). Textures are sandy loam, fine sandy loam and gravelly or cobbly equivalents. 2mm to 10cm rock fragments range from 5 to 35 percent by volume.

The C horizon has colors ranging from pale brown and light yellowish brown to reddish yellow (10YR 6/3, 6/4, 7.5YR 6/6). Textures are gravelly and cobbly sandy loam. 2mm to 10cm rock fragments range from 15 to 35 percent by volume.

Competing Series: These are the Mexispring soils that have a loamy-skeletal textural family class, have ochric surface colors; and an aridic soil moisture regime.

Geographic Setting: Ferroburro soils are on hills and mountains. Slopes are 30 to 75 percent. The soils formed in residum from granitic rocks. Elevations are 5000 to 7200 feet. The climate consists of hot, dry summers with infrequent thundershowers of short duration; and cool, moist winters. The mean annual precipitation is 8 to 10 inches.

Mean January air temperature is about 35°F; mean July air temperature is about 75°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 235 days.

Geographically Associated Soils: These are the competing Mexispring (t) and the Huntmount (t), Ulida (t), and Panamint (t) soils. Mexispring lack Huntmount and Ulida have argillic horizons. Huntmount soils are very deep. Panamint soils are moderately deep and have a combic horizon.

Drainage and Permeability: Well drained; medium to rapid runoff; moderately rapid permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, recreation and occasionally for livestock grazing. The native vegetation consists primarily of single-needle pinyon (*Pinus monophylla*), big sagebrush (*Artemisia tridentata*), black sagebrush (*Artemisia arbuscula*), and scattered perennial grasses.

Series Proposed: Inyo County, California; Saline Valley soil survey 1979.

Ferroburro Variant (1601)

The Ferroburro Variant consists of moderately deep, well drained soils formed in residuum from weathered limestone (Plate 45). Ferroburro Variant soils are on hills and mountains and have slopes of 30 to 75 percent. Mean annual precipitation is about 9 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Coarse-loamy, mixed (calcareous), mesic Xeric Torriorthents.

Typical Pedon: Ferroburro Variant stony sandy loam - on a steep convex mountain toe slope under Utah juniper and big sagebrush at 6900 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (5/76) the soil was moist between 6 and 30 inches.

The surface has a 5 percent litter of stones and cobbles.

A1 -- 0 to 8 inches; pale brown (10YR 6/3) stony sandy loam, brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few coarse and common fine roots; common fine interstitial pores; rock fragments 2mm-7cm, 10 percent by volume; 5 percent, 7-25cm, and 5 percent 25 - 50cm; slightly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt irregular boundary. (6 to 12 inches thick)

C1 -- 8 to 31 inches; pale brown (10YR 6/3) cobbly fine sandy loam, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; few fine and medium roots; common fine interstitial pores; rock fragments, 30 percent by volume, 5 percent 2mm-7cm, 15 percent 7-25cm and 10 percent 25-50cm; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); clear wavy boundary. (15 to 28 inches thick)

C2r -- 31 to 60 inches; highly weathered limestone, slakes when soaked in water; has veins of hard dolomite.

Location: Inyo County, California, Inyo Mountains, NE 1/4 of the NE 1/4 of Section 6, T. 11 S., R. 37 E., MDBM. About 1/2 mile south of Whipporwill Flat just west of the Saline Valley Road.

Plate 45. Ferroburro Variant stony sandy loam.

Range in Charateristics: The mean annual soil temperature is about 55°F. Depth to a paralithic contact with weathered limestone ranges from 20 to 40 inches. The soil is moderately alkaline throughout. The 10 to 40 inch textural control section contains 10 to 35 percent rock fragments and averages 10 to 18 percent clay. These soils are moist in some part from October through June.

The A horizon ranges in color from light brownish gray and pale brown to light yellowish brown (10YR 6/2, 6/3, 6/4). Textures is stony sandy loam.

The C horizon ranges in colors from pale brown to light brown (10YR 6/3, 6/4). Textures are gravelly or cobbly fine sandy loam.

Competing Series: These are the Cliffdown and Cliffdown Variant which are very deep and skeletal.

Geographic Setting: Ferroburro Variant soils are on hills and mountains. Slopes are 30 to 75 percent. The soils formed in residuum from weathered limestone. Elevations are 5500 to 8000 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration and cool, moist winters. The mean annual precipitation is 8 to 10 inches.

Mean January air temperature is about 35°F; mean July air temperatures is about 75°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 200 days.

Geographically Associated Soils: These are the Waucoba Variant and Cliffdown Variant, soils. Waucoba Variant have an argillic horizon. Cliffdown Variant soils are greater than 40 inches deep.

Drainage and Permeability: Well drained, medium runoff, moderately rapid permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, and recreation. The native vegetation consists primarily of single needle pinion (Pinus monophylla), Utah juniper (Juniperus osteosperma), and big sagebrush (Artemisia tridentata).

Greyeagle Series (1376)

The Greyeagle series consists of shallow, somewhat excessively drained soils formed in mixed alluvium (Plate 46). Greyeagle soils are on alluvial fans and have slopes of 5 to 9 percent. Mean annual precipitation is about 6 inches and mean annual air temperature is about 63°F.

Taxonomic Class: Loamy-skeletal, mixed, thermic, shallow Typic Durorthids.

Typical Pedon: Greyeagle very stony loam - on a sloping alluvial fan under creosotebush and burrobush at 2246 feet elevation. (Colors are for dry soil unless otherwise noted). When described (8/76) the soil was dry throughout.

60 percent of the surface is covered with a mosaic of rock fragments 2mm-7cm in diameter, 2 percent 7-25cm, and 5 percent 25cm+.

A11 -- 0 to 3 inches; very pale brown (10YR 7/3) very stony loam, brown (10YR 5/3) moist; strong, coarse platy, vesicular structure; hard, friable, slightly sticky and slightly plastic; common very fine interstitial pores; 60 percent by volume 2mm to 7cm rock fragments; 15

percent stones 2 percent cobbles; violently effervescent with disseminated lime; moderately alkaline (pH 8.0); abrupt smooth boundary. (3 to 4 inches thick)

A12 -- 3 to 6 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 4/4), moist, weak, fine, subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few fine interstitial pores; 15 percent by volume 2mm-7cm rock fragments; violently effervescent with disseminated lime; moderately alkaline (pH 8.1); clear wavy boundary. (3 to 5 inches thick)

C1ca -- 6 to 8 inches; very pale brown (10YR 7/3) very gravelly sandy loam, yellowish brown (10YR 5/4), moist; weak, fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; few fine interstitital pores; 2 to 5mm fragments, 40 percent by volume; violently effervescent with medium irregular soft masses of lime and coatings less than 1mm thick on rock fragments; moderately alkaline (pH 8.0); clear wavy boundary. (2 to 5 inches thick)

C2sicam -- 8 to 24 inches; white and very pale brown (10YR 8/2, 8/3), very pale brown (10YR 7/4), moist; massive, extremely hard, indurated by accumulations of silica and calcium carbonate; continuous duripan with thin opalized laminations between layers of cemented gravel; clear smooth boundary. (16 to 18 inches thick)

C3ca -- 24 to 60 inches; very pale brown (10YR 7/4), extremely gravelly and cobbly loamy sand and stratified, massive, firm, very hard, mixed gravelly alluvium.

Location: Inyo County, California, Saline Valley N 1/2 of SE 1/4 of Section 20, T. 15 S., R. 40 E., MDBM. About 1/4 mile south of intersection of Saline Valley Road and Lippincott mine road.

Range in Characteristics: Depth to an indurated, lime-silica cemented duripan ranges from 8 to 14 inches. The mean annual soil temperature is about 65°F. Reaction is moderately alkaline throughout. The textural control section averages 10 to 18 percent clay. These soils are dry throughout from June until late November.

The upper 3 to 4 inches of the A horizon consists of a vesicular layer of very stony loam to. Colors range from very pale brown and pale brown to light yellowish brown (10YR 7/3, 6/3, 6/4) throughout the A. Textures in the lower part of the A range from very gravelly sandy loam to very gravelly loamy sand. Rock fragments 2mm-7cm range from 35 to 60 percent by volume; 7cm-25cm 1 to 5 percent; and 25cm+, 1 to 2 percent.

The C1ca horizon has colors similar to the A horizon. Textures range from very gravelly sandy loam to very gravelly loamy sand. The C2sicam is an extremely hard, lime - silica cemented duripan. Underlying the duripan is mixed, extremely gravelly, stratified alluvium that is very hard to hard and massive.

Plate 46. Greyeagle very stony loam.

Competing Series: These are the, Greyeagle Variant, Osobb Variant, and Tybo Variant soils. Bunkerhill and Tybo are non-skeletal. Bunkerhill is hyperthermic. Tybo Variant and Osobb Variant are mesic. Greyeagle Variant has an argillic horizon.

Geographic Setting: Greyeagle soils are on alluvial fans. Slopes are 5 to 9 percent. The soils formed in mixed alluvium. Elevations are 1800 to 4000 feet. The climate consists of hot, dry summers, with infrequent thunder showers of short duration, and cool, moist winters. The mean annual precipitation is 4 to 8 inches.

Mean January air temperature is about 45°F; mean July air tempera-ture is about 85°F; mean annual air temperature is about 63°F. Frost-free season is 235 to 300 days.

Geographically Associated Soils: These are the Arizo series which lack the duripan and have a sandy-skeletal control section.

Drainage and Permeability: Somewhat excessively drained, rapid runoff, moderately rapid permeability in the soil above the duripan.

Use and Vegetation: Used mainly for wildlife habitat, and recreation. The native vegetation consists primarily of creosote bush (Larrea tridentata), burro bush (Ambrosia dumosa), Anderson thornbush (Lycium Andersonii), spiny hopsage (Grayia spinosa), and buckwheat (Eriogonum fasciculatum).

Series Proposed: Inyo County, California 1979; Saline Valley soil survey area.

Remarks: Series name derived from the Grey Eagle Talc Mine.

Greyeagle Variant (1013)

The Greyeagle Variant consists of shallow, well drained soils formed from mixed alluvium (Plate 47). Greyeagle Variant soils are on old uplifted alluvial fans and stream terraces and have slopes of 5 to 9 percent. Mean annual precipitation is about 6 inches and mean annual air temperature is about 63°F.

Taxonomic Class: Loamy-skeletal, mixed, thermic, shallow Haplic Durargids.

Typical Pedon: Greyeagle Variant bouldery sandy loam - on a sloping alluvial fan of 9 percent slope, under native vegetation at an elevation fo 4010 feet. (Colors are for dry soil unless otherwise noted.) When described (10/18/78) the soil was dry throughout.

Surface covered by a scattering of granitic rock fragments; 2 percent gravel, 2 percent cobbles, 3 percent stones, and 3 percent boulders.

A11 -- 0 to 1 inch; brown (10YR 5/3) bouldery sandy loam, dark brown (10YR 3/3) moist; moderate thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine and fine interstitial pores; rock fragments 10 percent by volume, 3 percent boulders, 3 percent stones, 2 percent cobbles, 2 percent gravel; slightly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (1 to 2 inches thick)

A12 -- 1 to 5 inches; brown (10YR 5/3) very cobbly sandy loam dark brown (10YR 3/3) moist; weak coarse angular blocky and moderate very fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; few fine tubular and common very fine interstitial pores; rock fragments 40 percent by volume; 5 percent stones, 15 percent cobbles, 20 percent gravel; slightly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (4 to 5 inches thick)

B2t -- 5 to 11 inches; yellowish brown (10YR 5/4) very cobbly heavy sandy loam, brown (10YR 4/3) moist; moderately medium and coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; common medium and few very fine and fine roots; common fine tubular and very fine interstitial pores; few thin clay films lining pores and common thin clay films bridging mineral grains; rock fragments 35 percent by volume, 5 percent stones, 15 percent cobbles, 15 percent gravel; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt irregular boundary. (3 to 8 inches thick)

B3tca -- 11 to 14 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few thin clay films bridging mineral grains; rock fragments 35 percent by volume, 5 percent stones, 15 percent cobbles, 15 percent gravel; violently effervescent with common fine soft masses of lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (2 to 5 inches thick)

C1sica -- 14 to 22 inches; white (10YR 8/2) weakly cemented opalized lamine sandwiched between soft gravelly sandy loam and calcium carbonate layers, very pale brown (10YR 7/3) moist; massive; hard, friable, nonsticky and nonplastic; violently effervescent, moderately alkaline (pH 8.0); gradual irregular boundary. (8 to 10 inches thick)

C2sica -- 22 to 60 inches, white (10YR 8/2) extremely bouldery sandy loam weakly cemented by silica and lime with thin opalized lenses and coatings on rock fragments, very pale brown (10YR 7/3) moist; massive; hard, friable, nonsticky and nonplastic; rock fragments 85 percent by volume, 75 percent boulders, 10 percent stones; violently effervescent, moderately alkaline (pH 8.0).

Location: Inyo County, California. In Saline Valley approximately 10 feet to the south of the main Saline Valley road at the mouth of grapevine canyon at 36°34'N Lat., 117°37'W Long.

Range in Characteristics: Depth to a weekly cemented, laminar duripan ranges from 10 to 20 inches. The mean annual soil temperature is about 59 to 62°F. The solum is 10 to 20 inches thick. Organic carbon content is greater than 1 percent in the surface 1 to 2 inches but decreases to less than .5 percent below. The soil is moderately alkaline throughout. The soils are dry throughout from May through November.

The A horizon is generally brown (10YR 5/3, 7.2YR 5/2) moist colors include dark brown (10YR 4/3, 3/3; 7.5YR 4/2). Texture is generally very bouldery or very cobbly sandy loam. Rock fragments range from 35 to 45 percent by volume, dominated by boulder or cobble sized fragments. Clay percentage increases with depth, ranging from 5 to 9 percent.

The Bt horizons are yellowish brown and light yellowish brown (10YR 5/4, 6/4); moist colors are brown (10YR 4/3, 5/3) and dark yellowish brown (10YR 4/4). Texture is predominantly very cobbly sandy loam. Rock

fragments range from 35 to 50 percent by volume, dominated by cobble size fragments. Clay percentage increases in the B2t to 13 to 18 percent and decreases in the B3t to 10 to 15 percent.

The Csica horizon is generally white (10YR 8/1, 8/2) and very pale brown (10YR 7/3, 7/4) moist. It consists of very gravelly, very cobbly, or extremely bouldery sandy loam with 1mm thick layers that are weakly cemented by lime and silica and contain numerous thin opalized lenses.

Plate 47. Greyeagle Variant bouldery sandy loam.

Competing Series: These are the, Greyeagle, Osobb Variant and Tybo Variant soils which lack the argillic horizon. Osobb Variant soils are mesic. Tybo Variant soils have bedrock above 40 inches and are mesic.

Geographic Setting: Greyeagle Variant soils are on old uplifted alluvial fans and stream terraces. Slopes are 5 to 9 percent. The soils formed in alluvium of mixed sources, primarily granitic rocks. Elevations are 3800 to 4400 feet. The climate consists of hot, dry summers with infrequent thundershowers of short duration, and cool, moist winters. The mean annual precipitation is 5 to 8 inches.

Mean January air temperature is about 45°F; mean July air temperature is about 85°F; mean annual air temperature is about 63°F. Frost-free season is about 235 to 300 days.

Geographically Associated Soils: These are the Arizo, Yellowrock, and Yermo soils which all lack the duripan and argillic horizon. Arizo soils are sandy. Yellowrock are sandy and non-skeletal.

Drainage and Permeability: Well drained; medium runoff; very slow permeability.

Use and Vegetation: Used mainly for wildlife habitat, and recreation. The native vegetation consists primarily of black brush (Coleogyne ramosissima), white bursage (Ambrosia dumosa), Anderson thornbush (Lycium Andersonii), spiny hopsage (Grayia spinosa), and buckwheat (Eriogonum fasciculatum).

Huntmount Series (1607)

The Huntmount series consists of very deep, well drained soils formed in residuum from granitic rocks and from colluvium derived from granitic rocks (Plate 48). Huntmount soils are on hills and mountains and have slopes of 30 to 75 percent. Mean annual precipitation is about 9 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Fine-loamy, mixed, mesic Typic Haploxeralfs.

Typical Pedon: Huntmount bouldery fine sandy loam - on a steep, convex mountain slope under Pinyon Pines at 7000 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (9/76) the soil was moist between 10 and 20 inches.

5 percent of surface covered by boulders, 10 percent stones, and 10 percent cobbles.

O1 -- 1/2 to 0 inch; litter of pinyon pine needles.

A11 -- 0 to 2 inches; brown (10YR 5/3) bouldery fine sandy loam, dark brown (10YR 3/3) moist; moderate coarse platy structure; slightly hard, very friable, slightly sticky and nonplastic; many fine, medium, and coarse roots; common fine tubular and interstitial pores; 5 percent by volume boulders, 10 percent stones, 10 percent cobbles; neutral (pH 7.0); clear wavy boundary. (2 to 4 inches thick)

A12 -- 2 to 27 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; hard, friable, slightly sticky and nonplastic; many fine, common medium and coarse roots; many fine tubular and interstitial pores; 2mm-7cm fragments, 5 percent by volume, and 5 percent 7-25cm; mildly alkaline (pH 7.5); gradual wavy boundary (18 to 29 inches thick)

B1t -- 27 to 34 inches; brown (7.5YR 5/4) stony heavy sandy loam, dark brown (7.5YR 4/4) moist; strong medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few thin clay films on ped faces and lining pores; many fine roots; common very fine tubular and interstitial pores; 10 percent by volume 2mm-7cm rock fragments, 15 percent 7-25cm fragments, and 10 percent 25cm+ fragments; mildly alkaline (pH 7.5); gradual wavy boundary. (0 to 7 inches thick)

B2t -- 34 to 43 inches; mixed brown and strong brown (7.5YR 5/2, 5/4, 5/6) cobbly loam, mixed dark brown and strong brown (7.5YR 3/2, 4/4, 5/6) moist; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; few thin clay films on ped faces and lining pores; few fine roots; common very fine interstitial pores; 2mm-7cm fragments, 15 percent by volume and 10 percent 7-25cm fragments; mildly alkaline (pH 7.5); gradual irregular boundary. (8 to 15 inches thick)

C1 -- 43 to 63 inches; mixed light reddish brown, brown, and strong brown (5YR 6/4, 7.5YR 5/4, 5/6) stony loam, mixed reddish brown, brown, and strong brown (5YR 4/4, 7.5YR 4/4, 4/6) moist; massive; very hard, very firm, slightly sticky and slightly plastic; few thin clay films bridging mineral grains; few fine roots; few very fine intersititial pores; 15 percent by volume 2mm-7cm weathered granitic fragments, 10 percent 7-25cm fragments, and 10 percent 25cm+ fragments; mildly alkaline (pH 7.5); diffuse wavy boundary. (12 to 25 inches)

C2r -- 62 to 90 inches; weathered mixed granodiorite and quartz monozonite, slake in water.

Location: Inyo County, California. About 1/2 mile north east of Jackass Spring on the Hunter Mountain Road at 36°30'30"N Lat. and 117°31'W Long.

Range in Characteristics: Depth to a paralithic contact with weathered granitic rock is greater than 60 inches. The mean annual soil temperature is about 55°F. Reaction is neutral or mildly alkaline throughout. These soils are moist in some part of the moisture control section from November through June. They are characteristically drier than the typical xeric moisture regime.

The A horizon ranges in color from grayish brown to brown (10YR 5/2, 5/3, 7.5YR 5/2, 5/4). Moist colors of the upper 2 to 4 inches are as dark as very dark gray, brown, and dark brown (10YR 3/2, 3/3). Textures are sandy loam and, fine sandy loam, with gravelly, cobbly, very gravelly, bouldery, and very cobbly equivalents. Rock fragments of 2mm to 7cm in diameter range from 0 to 25 percent by volume; and fragments of 7cm to 25cm in diameter range from 0 to 10 percent by volume. Boulders and stones occupy less than 15 percent. Clay averages 10 to 18 percent.

The C1 horizon, transtional to the weathered rock, has mixed colors of light reddish brown, brown, strong brown, and pale brown (5YR 6/4, 7.5YR 5/4, 5/6, 10YR 6/3). Textures are sandy clay loam, sandy loam, and loam, with gravelly, cobbly and stony equivalents. 2mm to 7cm rock fragments of weathered granitic rock range from 0 to 20 percent by volume, 7 to 25cm fragments, 0 to 15 percent; and 25cm+, 0 to 15 percent. The boundary between B2t and C1 is often characterized by interfingering.

The Bt horizons range in color from brown, strong brown, and reddish gray to reddish brown (7.5YR 5/2, 5/4, 5/6, 10YR 5/2, 5/3, 5/4). Textures are sandy clay loam, heavy sandy loam, and loam, with cobbly equivalents. Rock fragments 2mm to 7cm range from 0 to 25 percent by volume and 7cm to 100cm range from 0 to 10 percent by volume. The B1t, when present, has similar textures with stony equivalents. Clay content averages 18 to 25 percent.

Plate 48. Huntmount bouldery fine sandy loam.

Competing Series: Greyeagle Variant, Ulida, Waucoba, and Waucoba Variant. Greyeagle Variant has a duripan above 20 inches. Ulida has soft rock at depths less than 20 inches. Waucoba has hard rock above 20 inches. Waucoba Variant is skeletal and has bed rock at 20 and 40 inches.

Geographic Setting: Huntmount soils are on hills and mountains. Slopes are 30 to 75 percent. The soils formed in residuum from granitic rocks and from colluvium derived from granitic rocks. Elevations are 5,000 to 7,500 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration; and cool, moist winters. The mean annual precipitation is 8 to 10 inches.

Mean January air temperature is about 35°F; mean July air temperature is about 75°F; and mean annual air temperature is about 53°F. Frost-free season is 185 to 235 days.

Geographically Associated Soils: These are the Luckyrich (t), Ferroburro (t), Ulida (t), and Panamint (t) soils. Luckyrich soils have formed in alluvium lack an argillic horizon and have an aridic moisture regime bordering on Xeric. Ferroburro soils are shallow and lack an argillic horizon. Ulida soils are shallow. Panamint soils have a cambic horizon and are 20 to 40 inches to a paralithic contact.

Drainage and Permeability: Well drained; medium runoff; moderate permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, recreation, and occasionally for livestock grazing. The native vegetation consists primarily of single-needle pinyon (*Pinus monophylla*) and big sagebrush (*Artemisia tridentata*).

Series Proposed: Inyo County, California 1979; Saline Valley soil survey.

Remarks: Name coined from Hunter Mountain where the typical profile was described.

Luckyrich Series (1010)

The Luckyrich series consists of deep, well drained soils formed in alluvium of mixed sources. Luckyrich soils are on alluvial fans and pediments and have slopes of 5 to 20 percent. Mean annual precipitation is about 9 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Coarse-loamy, mixed nonacid, mesic Xeric Torriorthents.

Typical Pedon: Luckyrich gravelly sandy loam - on a gently sloping valley margin under big sagebrush at 6100 feet elevation. (Colors are

for dry soil unless otherwise noted.) When described (8/76) the soil was dry throughout.

A11 -- 0 to 2 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 5/3) moist; weak very fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores, 2mm-1cm fragments, 15 percent by volume; moderately alkaline (pH 8.0); abrupt smooth boundary. (2 to 4 inches thick)

A12 -- 2 to 30 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; common fine and medium roots; common fine interstitial pores; 2mm-1cm fragments, 20 percent by volume; moderately alkaline (pH 8.0); clear wavy boundary. (28 to 35 inches thick)

C1 -- 30 to 40 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, slightly sticky and nonplastic; few fine roots; common fine interstitital pores; slightly effervescent with disseminated lime, moderately alkaline (pH 8.0); clear wavy boundary. (10 to 21 inches)

IIC2r -- 40 to 60 inches; weathered quartz monzonite with seams and soft masses of lime.

<u>Location</u>: Inyo County, California. About 1/4 mile east of the Hunter Mountain - Death Valley Road at about 36°36'N Lat, 117°27'W Long.

<u>Range in Characteristics</u>: Depth to unrelated weathered granitic rock ranges from 40 to 60 inches. The mean annual soil temperature is about 54 to 59°F. Reaction is mildly to moderately alkaline throughout, and usually slightly calcareous below 30 inches. Clay averages 10 to 18 percent in the 10 to 40 inch textural control section. These soils are moist in some part from mid October through early June in most years. They are dry in all parts between early June and mid October.

The A horizon ranges in color from light brownish gray and pale brown to pinkish gray (10YR 6/2, 6/3, 7.5YR 6/2). Textures are gravelly sandy loam, gravelly fine sandy loam. Rock fragments, 2mm to 1cm in diameter, range from 15 to 35 percent by volume.

The C horizon ranges in color from pale brown and light brownish gray to light brown (10YR 6/3, 6/4, 7.5YR 6/4). Textures are gravelly sandy loam and gravelly fine sandy loam. Rock fragments, 2mm to 1cm range from 15 to 35 percent by volume.

Unrelated granitic rock, which slakes when soaked in water, occurs at depths greater than 40 inches. This weathered rock contains seams and filaments of lime in cracks, and a few soft masses in pockets in the rock.

Competing Series: These are the Luckyrich Variant which are moist in the moisture control section for a longer period of time.

Geographic Setting: Luckyrich soils are on alluvial fans and pedments at intermountain valley margins. Slopes are 5 to 20 percent. The soils formed from alluvium of mixed origin, primarily granitic rocks. Elevations are 4500 to 6500 feet. The climate consists of hot, dry summers with infrequent thunder storms of short duration; and cool, moist winters. The mean annual precipitation is 8 to 10 inches.

Mean January air temperature is about 40°F; mean July air temperature is about 80°F. Mean annual air temperature is about 53°F. Frost-free season is about 185 to 235 days.

Geographically Associated Soils: These are the Mexispring (t), Ulida (t) and Panamint (t) series. Mexispring and Ulida are shallow. Ulida soils have an argillic horizon. Panamint soils have a mollic epipedon, a cambic horizon, and a Xeric moisture regime.

Drainage and Permeability: Well drained; slow runoff; moderately rapid permeability.

Use and Vegetation: Used mainly for watershed, range, wildlife habitat and recreation. The natural vegetation is dominantly big sagebrush (Artemisia tridentata), and needlegrass (Stipa speciosa).

Series Proposed: Inyo County, California; Saline Valley soil survey 1979.

Remarks: Named for the Luckyrich Mine.

Luckyrich Variant (1011)

The Luckyrich Variant consists of very deep, well drained soils developed in alluvium, primarily from granitic rocks. Luckyrich Variant soils are on flats in intermountain valleys and have slopes of 0 to 5 percent. Mean annual precipitation is about 9 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Coarse-loamy, mixed nonacid, mesic Typic Xerorthents.

Typical Pedon: Luckyrich Variant loamy coarse sand - on a gently sloping valley botton under native vegetation at 6000 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (9/76) the soil was slightly moist between 5 and 40 inches.

A11 -- 0 to 3 inches; pale brown (10YR 6/3) loamy coarse sand, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and slightly plastic; common fine and few coarse roots; common fine interstitial pores; 2-3mm fragments, 5 percent by volume; moderately alkaline (pH 8.0); gradual wavy boundary. (10 to 20 inches thick)

A12 -- 3 to 16 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and slightly plastic; common fine and few coarse roots; common fine interstitial pores; 2-3mm fragments, 5 percent by volume; moderately alkaline (pH 8.0); gradual wavy boundary. (10 to 20 inches thick)

C1 -- 16 to 25 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and nonplastic; common fine roots; common fine and medium interstitial pores; 2-3mm fragments, 5 percent by volume; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); gradual wavy boundary. (8 to 15 inches thick)

C2 -- 25 to 60 inches; pale brown (10YR 6/3) weakly stratified light sandy loam to sand, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; common fine interstitial pores; 2-3mm fragments, 10 percent by volume; slightly effervescent with disseminated lime, moderately alkaline (pH 8.0).

Location: Inyo County, California. About 1 mile northwest of the Hunter Mountain - Death Valley Road and about 200 feet southeast of Spanish Spring at 36°36'N, Lat. 117°31'W Long.

Depth to unrelated granitic rock is greater than 60 inches. The mean annual soil temperature is about 55°F. Reaction is moderately alkaline throughout with lime increasing with depth from 16 inches. Rock fragments, 2-3mm in diameter, range from 0 to 15 percent by volume throughout. Clay content averages about 12 to 15 percent in the 10 to 40 inch textural control section. The soil is assumed to be moist 90 consecutive days that the soil temperature is greater than 41°F due to its low, basin position.

The A horizon ranges in color from light brownish gray to pale brown (10YR 6/2, 6/3). Textures are loamy coarse sand in the surface 1 to 4 inches and sandy loam through the rest of the A.

The C horizon has colors of light brownish gray and pale brown (10YR 6/2, 6/3). Textures are sandy loam, and in some pedons sandy clay loam in the very lower part, below 40 inches. The C usually contains very fine to moderately thick weakly stratified layers with textures of loamy sand, sand, sandy loam, and loamy coarse sand.

Competing Series: These are the Bluewing, Cliffdown, Luckyrich, Yellowrock, and Yermo series which have an aridic soil moisture regime. Bluewing, Cliffdown, and Yermo are skeletal. Bluewing and Yellowrock are sandy.

Geographic Setting: Luckyrich Variant soils are in flats in intermountain valleys. Slopes are 0 to 5 percent. The soils formed from mixed alluvium, primarily from granitic rocks. Elevations are 4500 to 6500 feet. The climate consists of hot, dry summers, with infrequent

thunder storms of short duration; and cool, moist winters. The mean annual percipitation is about 8 to 10 inches.

Mean January air temperature is about 40°F; mean July air temperature is about 80°F; mean annual air temperature is about 53°F. Frost-free season is about 185 to 235 days.

Geographically Associated Soils: These are the Luckyrich and Ulida series. Luckyrich soils are moderately deep and have an aridic soil moisture regime. Ulida are shallow, have an argillic horizon, and an aridic moisture regime.

Drainage and Permeability: Well drained; slow runoff; moderately rapid permeability.

Use and Vegetation: Used mainly for wildlife habitat, recreation, and range. The natural vegetation is primarily big sagebrush (Artemisia tridentata) and rabbitbrush (Chrysothamnus nauseosus).

Mexispring Series (1606)

The Mexispring series consists of shallow, somewhat excessively drained soils formed in residuum from granitic rocks (Plate 49). Mexispring soils are on hills and mountains and have slopes of 15 to 50 percent. Mean annual precipitation is about 7 inches and mean annual air temperature is about 55°F.

Taxonomic Class: Loamy-skeletal, mixed, nonacid, mesic, shallow Typic Torriorthents.

Typical Profile: Mexispring very cobbly sandy loam - on a steep convex hillside under joshua trees and buckwheat at 6600 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (8/76) the soil was dry throughout.

20 percent of the surface is littered by 2mm-7cm gravel, 15 percent 7-25cm cobbles and 1 percent stones 25cm+.

A11 -- 0 to 1 inch; pale brown (10YR 6/3) very cobbly sandy loam, brown (10YR 4/3) moist; weak very thick platy structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common fine vesicular and intersititial pores; 2mm-7cm fragments; 20 percent by volume, 15 percent 7-25cm, and 1 percent 25cm+; moderately alkaline (pH 8.0); clear wavy boundary. (1 to 3 inches thick)

A12 - 1 to 6 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few thin ferrans on coarse fragments; few very fine roots; common medium interstitial pores; 2mm-7cm fragments, 50 percent by volume, 10 percent 7 to 25cm fragments; moderately alkaline (pH 8.0); clear wavy boundary. (3 to 11 inches thick)

Cr -- 6 to 15 inches; weathered granitic rock, slakes when soaked in water.

Location: Inyo County, California, Saline Valley. About 4 1/2 miles northeast of Jackass spring along the Hunter Mountain Road. In an unsurveyed area. 2 miles west of the Death Valley Monument southwest boundary and about 1 mile south of Ulida Flat; 36°37'N and 117°31'W.

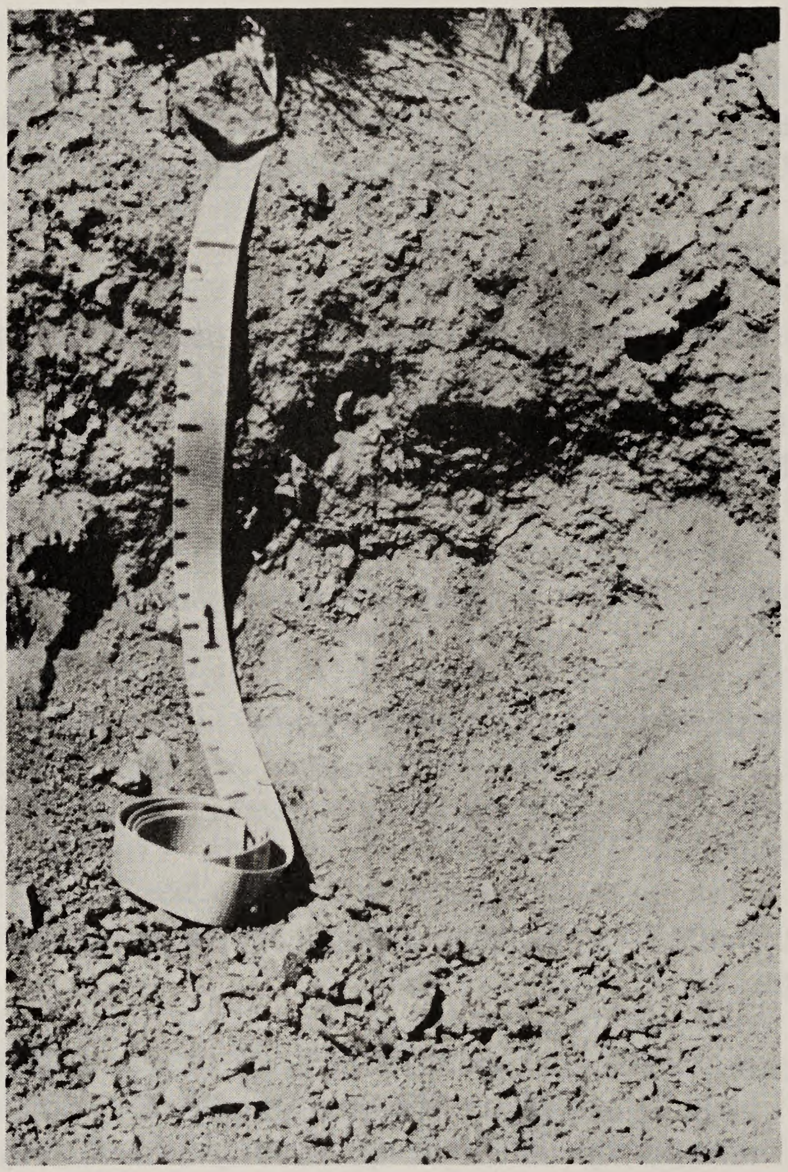


Plate 49. Mexispring very gravelly sandy loam.

Range in Characteristics: Depth to a paralithic contact with weathered granitic rock ranges from 4 to 14 inches. The mean annual soil temperature is about 55°F. Reaction is moderately alkaline throughout. This soil is dry from June through early November.

A11 horizon ranges in texture from very gravelly sandy loam to very cobbly sandy loam and fine sandy loam. 2mm to 7cm rock fragments range from 35 to 50 percent by volume. The A12 has textures ranging from very gravelly sandy loam to very gravelly fine sandy loam. 2mm to 7cm rock fragments range form 35 to 80 percent by volume. The A horizon ranges in color from light brownish gray and pale brown to pinkish gray (10YR 6/2, 6/3, 7.5YR 6/2).

The bedrock consists of weathered granite, granodiorite and quartz monzonite which slake when soaked in water. Fractures are widely spaced, more than 20cm, and are less than 2mm wide.

Competing Series: These are the Ferroburro soils which are non-skeletal.

Geographic Setting: Mexispring soils are on hills and mountains. Slopes are 15 to 50 percent. The soils formed in residuum from granitic rocks. Elevations are 4000 to 6500 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration; and cool, moist winters. Mean annual precipitation is 6 to 8 inches.

Mean January air temperature is about 40°F; mean July air temperature is about 80°F; and mean annual air temperature is about 53°F. Frost-free season is 185 to 235 days.

Geographically Associated Soils: These are the Ulida (t) and Panamint (t) soils. Ulida soils have an argillic horizon. Panamint soils are moderately deep have a mollic epipedon, a cambic horizon, and a xeric moisture regime.

Drainage and Permeability: Somewhat excessively drained; rapid runoff; moderately rapid permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, recreation, and livestock grazing. The native vegetation consists primarily of green Mormon tea (*Ephedra viridis*), California desert buckwheat (*Eriogonum fasciculatum*), needlegrass (*Stipa speciosa*), joshua tree (*Yucca brevifolia*), big sagebrush (*Artemisia tridentata*), and bitter brush (*Pursha tridentata*).

Series Proposed: Inyo County, California; Saline Valley soil survey 1979.

Remarks: Name coined from Spanish Spring near where the typifying pedon was described.

Osobb Variant (1012)

The Osobb Variant consists of shallow, well drained soils formed from mixed alluvium primarily of igneous rocks. Osobb Variant soils are

in intermountain basins and on alluvial fans and have slopes of 0 to 9 percent. Mean annual precipitation is about 7 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic, shallow Typic Durorthids.

Typical Pedon: Osobb Variant extremely gravelly very fine sandy loam - on a gently sloping intermountain basin under native vegetation at 5600 feet elevation. (Colors are for dry soil unless otherwise noted). When described (9/76) the soil was dry throughout.

85 percent of the surface is covered by a loose mosaic of 2mm-7cm fragments.

A1 -- 0 to 3 inches; light gray (10YR 7/2) extremely gravelly very fine sandy loam, brown (10YR 5/3) moist; moderate vesicular structure; very hard, firm, slightly sticky and slightly plastic; common fine roots; common fine and medium vesicular pores; 2mm-7cm fragments, 85 percent by volume; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (1 to 4 inches thick)

C1ca -- 3 to 12 inches; white (10YR 8/2) very gravelly loam, light yellowish brown (10YR 6/4) moist; massive; hard, firm, nonsticky and nonplastic; common fine roots; ccommon fine tubular and interstitial pores; 2-5mm fragments, 40 percent by volume; violently effervescent with a few fine soft masses of lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (9 to 16 inches thick)

C2sicam -- 12 to 16 inches; white (10YR 8/2) lime-silica indurated duripan with laminar opalized layers; massive; extremely hard; 2mm-2cm fragments, 80 percent by volume; violently effervescent with lime coating rock fragments; clear wavy boundary. (4 to 6 inches thick)

C3ca -- 16 to 50 inches; white (10YR 8/2) very gravelly fine sandy loam, light yellowish brown (19YR 6.4) moist; massive; loose, nonsticky and nonplastic; common very fine interstitial pores; 2mm-2cm fragments, 50 percent by volume; violently effervescent with lime coating rock fragments, moderately alkaline (pH 8.0)

Location: Inyo County, California. In Saline Valley about 3 miles west of the Saline Valley corredor road in a basin in the Saline Range, 3 1/2 miles southwest of Marble Bath at 36°56'N Lat, 17°43'W Long.

Range in Characteristics: Depth to an opalized, lime-silica cemented duripan ranges from 10 to 20 inches. The mean annual soil temperature is about 57°F. The reaction is moderately alkaline throughout, with lime percentages increasing with depth. The soil is dry throughout from June until late November.

The A horizon ranges in color from light gray and very pale brown to white (10YR 7/2, 7/3, 8/2). Textures are gravelly, very gravelly, and extremely gravelly loam, silt loam, and very fine sandy loam. Rock fragments, 2mm-7cm in diameter, range from 15 to 85 percent by volume for the surface 1 to 5 inches and 35 to 50 to the duripan.

The C1ca is white (10YR 8/2). Textures are very gravelly loam and fine sandy loam. The C2sicam consists of thin continuous, laminar, lime-silica cemented opalized layers coating and cementing the rock fragments. This layer has colors of white and very pale brown (10YR 8/2, 8/3) The C3ca has colors similar to the C2sicam but lacks the indurated layers. Textures are very gravelly fine sandy loam and sandy loam. The C3ca is loose, unconsolidated gravelly alluvium.

Competing Series: These are the Greyeagle, Greyeagle Variant, and Tybo Variant soils. Greyeagle soils are thermic, have a thick, extremely hard duripan, and lack bedrock within 60 inches. Greyeagle Variant are thermic, have a weakly cemented duripan, and an argillic horizon. Tybo Variant soils have fewer than 35 percent rock fragments and bedrock above 40 inches.

Geographic Setting: Osobb Variant soils are in intermountain basins and on alluvial fans. Slopes are 0 to 9 percent. The soils formed from mixed alluvium, primarily from igneous rocks. Elevations are 4200 to 6100 feet. The climate consists of hot dry summers with infrequent thunderstorms of short duration, and cool moist winters. The mean annual precipitation is 6 to 8 inches.

Mean January air temperature is about 40°F; mean July air temperature is about 80°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 235 days.

Geographically Associated Soils: These are the Arizo and Cliffdown series. Arizo and Cliffdown are very deep. Arizo soils are thermic and have a sandy-skeletal control section. Cliffdown soils are coarse-loamy.

Drainage and Permeability: Well drained; medium runoff; moderate permeability in the soil above the duripan.

Use and Vegetation: Used mainly for wildlife habitat. The natural vegetation is primarily shadscale (*Atriplex confertifolia*), spiny hopsage (*Grayia spinosa*), and scattered winterfat (*Eurotia lanata*).

Panamint Series (1613)

The Panamint series consists of moderately deep, well drained soils formed in residum from granitic rocks (Plate 50). Panamint soils are on hills and mountains and have slopes of 15 to 50 percent. Mean annual precipitation is about 9 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Coarse-loamy, mixed, mesic Typic Haploxerolls.

Typical Pedon: Panamint cobbly very fine sandy loam - on a steep concave north slope, under big sagebrush, at 6150 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (10/19/78) the soils was slightly moist between 15 and 20 inches.

Surface littered by 1 percent boulders, 2 percent stones, 20 percent cobbles, and 5 percent gravel.

A11 -- 0 to 2 inches; dark grayish brown (10YR 4/2) cobbly very fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate coarse platy structure; soft, very friable, nonsticky and slightly plastic; common very fine roots; few fine tubular and interstitial pores; rock fragments 2mm-7cm 5 percent by volume; 7-25cm, 20 percent; 25cm+, 3 percent; mildly alkaline (pH 7.4); clear smooth boundary. (1 to 3 inches thick)

A12 -- 2 to 6 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine and fine roots; few fine tubular and interstitial pores; rock fragments 2m-7cm, 10 percent by volume; mildly alkaline (pH 7.4); clear wavy boundary. (3 to 6 inches thick)

B2 -- 6 to 18 inches; brown (10YR 5/3) gravelly fine sandy loam, very dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and medium, few coarse roots; common medium tubular and few fine interstitial pores; rock fragments 2mm-7cm 15 percent by volume; non-effervescent, moderately alkaline (pH 7.6); abrupt irregular boundary. (12 to 15 inches thick)

C1 -- 18 to 24 inches; brown (10YR 5/3) gravelly fine sandy loam, dark brown (10YR 4/3) moist; massive; extremely hard, firm, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular and interstitial pores; rock fragments 2mm-7cm 20 percent by volume; non-effervescent moderately alkaline (pH 8.0); gradual wavy boundary. (5 to 16 inches thick)

C2r -- 24 to 60 inches; thick; highly weathered quartz monzonite. Has vertical fractures 25cm apart and 2mm in diameter. Contains some hard, unweathered cobble and stone sized fragments. Roots extend down cracks; violently effervesent with powdery lime lining some fractures.

Location: Inyo County, California, Nelson Range. About 1/2 mile northeast of the junction of Saline Valley Road and Hunter Mountain Road on the southside of the Hunter Mountain Road at about 36°32'N Lat. and 117°32'30"W Long.

Plate 50. Panamint cobbly very fine sandy loam.

Range in Characteristics: Depth to a paralithic contact with granitic rock ranges from 20 to 40 inches. The mean annual soil temperature is about 55°F. Organic carbon content of the upper 18 inches ranges from .6 to 2 percent. The soil is mildly or moderately alkaline and non-effervescent. These soils are moist in some part from October through June or early July. The are characteristically drier than the typical xeric moisture regime.

The A horizon ranges in color from grayish brown and dark grayish brown to brown (10YR 5/2, 4/2, 5/3). Moist colors are very dark grayish brown and dark brown (10YR 3/2, 3/3). Textures are very fine sandy loam, fine sandy loam, sandy loam, and cobbly or gravelly equivalents. Rock fragments 2mm-25cm range from 5 to 35 percent by volume.

The B2 horizon ranges in color from brown to yellowish brown (10YR 5/2, 5/4; 7.5YR 5/2, 5/4). Moist colors are very dark grayish brown and dark brown (10YR 3/2, 3/3; 7.5YR 3/2). Textures are gravelly very fine sandy loam or gravelly fine sandy loam. Clay content ranges between 10 and 18 percent. Rock fragments, 2m-25cm, range from 15 to 35 percent by volume.

The C1 horizon has colors ranging from brown to pale brown (10YR 5/3, 6/3). Moist colors are dark brown and brown (10YR 3/3, 3/4). Texture is gravelly sandy loam. Rock fragments, 2mm-25cm, range from 15 to 35 percent.

The bedrock consists of weathered and fractured granite, granodiorite, and quartz monzonite with powdery lime lining the fractures.

Competing Series: There are no series within this class or a closely similar class in this survey area. They appear similar to the Luckyrich soils which have unrelated granite below 40 inches and lack the cambic horizon.

Geographic Setting: Panamint soils are on hills and mountains. Slopes are 15 to 50 percent. The soils formed in residuum from granitic rocks. Elevations are 4000 to 6500 feet. The climate consists of hot, dry summers with infrequent summer thunder storms of short duration; and cool, moist winters. The mean annual precipitation is 8 to 10 inches.

Mean January air temperature is about 40°F; mean July air temperature is about 80°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 235 days.

Geographically Associated Soils: These are the Mexispring (t), Huntmount (t), Ferroburro (t), and Ulida (t) soils. Mexispring, Ferroburro, and Ulida soils are shallow. Ulida and Huntmount soils have argillic horizons. Huntmount soils are very deep. Mexispring and Ulida soils have an aridic moisture regime.

Drainage and Permeability: Well drained, medium runoff, moderately rapid permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, recreation and livestock grazing. The native vegetation is primarily California desert buckwheat (*Eriogonum fasciculatum*), needlegrass (*Stipa speciosa*), Anderson thornbush (*Lycium Andersonii*), green Mormon tea (*Ephedra viridis*), scattered joshua tree (*Yucca brevifolia*), scattered Utah juniper (*Juniperus osteosperma*), Pinyon Pine (*Pinus monophylla*), and scattered big sagebrush (*Artemisia tridentata*).

Series Proposed: Inyo County, California; Saline Valley Soil Survey 1979.

Remarks: Series named for the Panamint Range.

Theriot Series (1611)

The Theriot series consists of shallow, well drained soils formed in residuum from carbonate sedimentary rocks. Theriot soils are on hills and mountains and have slopes of 5 to 75 percent. Mean annual precipitation is about 8 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Loamy-skeletal, carbonatic, mesic Lithic Torriorthents.

Typical Pedon: Theriot extremely cobbly loam - on a very steep, convex mountain slope, under native vegetation at 6600 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (12/76) the soils were dry throughout.

50 percent of the surface is paved with 2mm-7cm fragments, and 30 percent 7-25cm fragments.

A11 -- 0 to 1 inch; pale brown (10YR 6/3) extremely cobbly loam, brown (10YR 4/3) moist; weak (vesicular) coarse platy structure; slightly hard, very friable, nonsticky and slightly plastic; few very fine roots; common fine vesicular pores; 2mm-7cm rock fragments, 50 percent by volume and 30 percent 7-25cm fragments; strongly effervescent with disseminated lime, moderately akaline (pH 8.0); abrupt wavy boundary. (1 to 2 inches thick)

A12 -- 1 to 6 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; massive; hard, very friable, nonsticky and slightly plastic; few very fine roots; common very fine interstitial pores; 2mm-7cm fragments, 40 percent by volume; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (4 to 12 inches thick).

R -- 6 inches; fractured dolomite, no displacement, fractures are 1cm to 10cm apart both vertically and horizontally and less than 1mm wide.

Location: Inyo County, California. In the Inyo Mountains Nelson Range about 2 miles north of Bonham Talc Mine at 36°38'N Lat. and 117°47'W Long.

Range in Characteristics: Depth to a lithic contact with limestone or calcareous shale ranges from 5 to 14 inches. Reaction is moderately alkaline throughout. The mean annual soil temperature is about 55°F. These soils are dry from June until mid November in most years.

The A11 horizon is pale brown, light yellowish brown, or very pale brown (10YR 6/3, 6/4, 7/4). Textures range from gravelly or shaly loam to extremely gravelly, extremely cobbly, or extremely shaly loam, and occasionally gravelly sandy loam. Structure is often platy and vesicular but may be fine granular. The surface is usually paved by rock

fragments. Rock fragments, 2mm-7cm, range from 15 to 50 percent by volume and 7-25 cm, 10 to 30 percent. The A12 horizon is pale brown or light yellowish brown (10YR 6/3, 6/4). Textures are very gravelly or very shaly loam. The A12 is usually massive. Rock fragments, 2mm to 7cm in size range between 35 and 50 percent by volume.

The bedrock is fractured limestone or calcareous shale. Cracks occur from 1cm to 10cm apart both vertically and horizontally with little displacement of the fragments. Some pedons have a 1 to 2mm opal coating on some of the rock fragments.

Competing Series: These are the Beveridge, Blacktop, Mexispring, and Upspring Series. Beveridge is frigid. Blacktop has a calcareous reaction class. Mexispring has a non-acid reaction class. Upspring is thermic.

Geographic Setting: Theriot soils are on hills and mountains. Slopes are 5 to 75 percent. The soils formed in residuum from carbonate sedimentary rocks. Elevations are 4,000 to 7,000 feet. The climate consists of hot, dry summers with infrequent thunderstorms of short duration and cool, moist winters. The mean annual precipitation is 6 to 10 inches.

Mean Janaury air temperature is about 35°F; mean July air temperature is about 75°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 200 days.

Geographically Associated Soils: These are the Ferroburro Variant, and Beveridge soils. Ferroburro Variant has a paralithic contact, is non-skeletal, and is moderately deep. Beveridge is frigid.

Drainage and Permeability: Well drained, rapid to very rapid runoff, moderate permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat and recreation. The native vegetation consists primarily of four-wing saltbush (Atriplex canescens), scattered Utah juniper (Juniperus Osteosperma), and scattered big sagebrush (Artemisia tridentata). Upper elevations may have a few scattered single-needle pinyon (Pinus monophylla).

Tybo Variant (1578)

The Tybo Variant consists of shallow, somewhat excessively drained soils formed in residuum and alluvium derived from extrusive igneous rocks. Tybo Variant soils are on plateaus and pediments and have slopes of 2 to 5 percent. Mean annual precipitation is about 7 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Loamy, mixed, mesic, shallow Typic Durorthids.

Typical Pedon: Tybo Variant gravelly fine sandy loam - on a gently sloping pediment under native vegetation at 6400 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (8/76) the soil was dry throughout.

25 percent of the surface is littered by gravel, 2mm-7cm and 1 percent cobbles, 7-10cm.

A11 -- 0 to 2 inches; pale brown (10YR 6/3) gravelly very fine sandy loam, brown (10YR 4/3) moist; moderate coarse platy (vesicular) structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many fine and medium vesicular pores; 2mm-7cm rock fragments, 25 percent by volume; slightly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt smooth boundary. (2 to 3 inches thick)

A12 -- 2 to 10 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, slightly sticky and slightly plastic; many very fine and common fine and medium roots; common very fine tubular and interstitial pores; 2-5mm rock fragments, 5 percent by volume; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0); gradual wavy boundary. (8 to 10 inches thick)

C1ca -- 10 to 14 inches; very pale brown (10YR 7/4) cobbly silt loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common fine tubular and interstitial pores; 7-9cm rock fragments, 20 percent by volume and 2-5mm fragments, 5 percent by volume; strongly effervescent with lime coating rock fragments, moderately alkaline (pH 8.0); clear wavy boundary. (4 to 7 inches thick)

C2sicam -- 14 to 25 inches; white (10YR 8/2) fractured lime-silica indurated duripan. Boundary is very diffuse and very wavy. Fractured pieces of duripan are not displaced and are larger than 4 inches in diameter. (10 to 12 inches thick)

C3r -- 25 to 30 inches; weathered basalt, highly fractured, strongly effervescent with disseminated lime; clear irregular boundary. (4 to 8 inches thick)

R -- 30 inches; hard fractured basalt.

Location: Inyo County, California. In the Nelson Range, about 4 miles northwest on the Inyo crest jeep trail near Lee Flat at 36°32'N Lat. and 117°38'W Long.

Range in Characteristics: Depth to an indurated lime-silica cemented duripan ranges from 14 to 20 inches. The mean annual soil temperature is about 55°F. Reaction is moderately alkaline throughout. These soils are dry from late May until mid November.

The A horizon ranges in texture from gravelly very fine sandy loam and gravelly fine sandy loam in the surface 2 to 3 inches to loam or gravelly loam in the remainder. Colors are pale brown and light yellowish brown (10YR 6/3, 6/4). Rock fragments range from 15 to 35 percent by volume in the surface 2 to 3 inches and from 0 to 35 percent in the remainder of the A horizon, dominated by 2mm to 7cm sizes.

The C1ca horizon has textures of cobbly very fine sandy loam and cobbly loam 2mm-7cm rock fragments range from 5 to 10 percent by volume and 7cm 10cm, from 10 to 25 percent; totals average fewer than 35 percent. Colors are very pale brown (10YR 7/3, 7/4). The C2sicam consists of a gravelly, lime-silica cemented duripan that first grades into weathered and fractured basalt at 25 to 30 inches and finally into harder basalt below 30 inches.

Competing Series: These are the Greyeagle, Greyeagle Variant, and Osobb Variant soils. Greyeagle soils are thermic, have a thick, extremely hard duripan, more than 35 percent rock fragments, and lack bedrock within 60 inches. Greyeagle Variant are thermic, have a weakly cemented duripan, and an argillic horizon. Osobb soils have greater than 35 percent rock fragments in the textural control section and bedrock ranging below 40 inches.

Geographic Setting: Tybo Variant soils are on plateaus and pediments. Slopes are 2 to 5 percent. The soils formed in residuum from extrusive igneous rocks and in an alluvial veneer over extrusive igneous rocks. Elevations are 5000 to 6400 feet. The climate consists of hot, dry summers with infrequent thunder storms duration, and cool, moist winters. The mean annual precipitation is 7 to 9 inches.

Mean January air temperature is about 40°F; mean July air temperature is about 80°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 235 days.

Geographically Associated Soils: There are no other soils mapped adjacent to Tybo soils in the same landform in this survey area.

Drainage and Permeability: Somewhat excessively drained, medium runoff, moderate permeability above the duripan.

Use and Vegetation: Use mainly for watershed, wildlife habitat, and recreation. Native vegetation consists primarily of big sagebrush (*Artemisia tridentata*), spiny hopsage (*Grayia spinosa*), needlegrass (*Stipa speciosa*), and Joshua trees (*Yucca brevifolia*).

Ulida Series (1610)

The Ulida series consists of shallow, well drained soils formed in residuum from granitic rocks (Plate 51). Ulida soils are on pediments,

hills, and mountains and have slopes of 2 to 50 percent. Mean annual precipitation is about 9 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Loamy, mixed, mesic, shallow Xeralfic Haplargids.

Typical Pedon: Ulida loamy coarse sand - on a gently rolling pediment, under big sagebrush, at 6200 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (9/76) the soil was moist between 10 and 15 inches.

A11 -- 0 to 2 inches; brown (10YR 5/3) loamy coarse sand, brown (10YR 4/3) moist; weak medium platy structure; loose, nonsticky and nonplastic; few very fine and many fine roots; common fine interstitial pores; 2-3mm fragments, 5 percent by volume; moderately alkaline (pH 8.0); abrupt smooth boundary. (2 to 3 inches thick)

A12 -- 2 to 5 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; common fine intersititial pores; 2-3mm fragments, 5 percent by volume; moderately alkaline (pH 8.0); abrupt wavy boundary. (2 to 3 inches thick)

B2t -- 5 to 15 inches; mixed reddish yellow (5YR 5/8, 7.5YR 7/8) sandy clay loam, dark yellowish brown, strong brown and yellowish red (10YR 4/4, 7.5YR 5/8, 5YR 4/8) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common thin clay films bridging mineral grains; common fine roots; common very fine tubular and interstitial pores; 2-3mm fragments, 10 percent by volume; moderately alkaline (pH 8.0); gradual wavy boundary. (6 to 9 inches thick)

C1 -- 15 to 19 inches; yellow (10YR 7/6) gravelly sandy loam, yellowish brown (10YR 5/6) moist; massive; very hard, very firm, slightly sticky and nonplastic; few fine interstitial pores; 2-3mm fragments, 20 percent by volume; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); gradual wavy boundary. (0 to 5 inches thick)

C2r -- 19 to 22 inches; weathered quartz monzonite, slakes in water.

Location: Inyo County, California. About 3/4 mile east of Spanish Spring and 2 miles west of the Hunter Mountain Road at 36°35'N Lat. and 117°31'W Long.

Range in Characteristics: Depth to a paralithic contact with weathered granitic rock ranges from 10 to 20 inches. Mean annual soil temperature is about 55°F. Reaction is mildly to moderately alkaline throughout. Some pedons have disseminated lime increasing with depth below 10 inches. These soils are moist in some part of the moisture control section from November until June and dry thoughout from mid June through early November.

The A horizon ranges in color from grayish brown to brown (10YR 5/2, 5/3, 7.5YR 5/2). Moist colors are dark grayish brown and brown (10YR 4/2, 4/3; 7.5YR 4/2). Textures are sandy loam with loamy coarse sand in the upper 1 to 2 inches. Some pedons have a bouldery loamy coarse sand surface. 2 to 3mm rock fragments range from 5 to 15 percent by volume; some areas have 7cm to 100cm rock fragments ranging to 5 percent of the very surface. Clay averages 5 to 10 percent in the upper 1 to 2 inches and 10 to 20 in the lower part of the A.

The B2t horizon has colors ranging from brownish yellow to reddish yellow (10YR 5/8 6/4, 7/2; 5YR 6/6, 6/8; 7.5YR 7/6, 7/8). Textures are sandy clay loam and gravelly sandy clay loam. 2 to 3mm rock fragments range from 5 to 35 percent by volume. Clay averages 20 to 30 percent.

The C horizon grades into a paralithic contact with weathered granitic rock. Textures in the C are gravelly sandy loam and gravelly coarse sandy loam. 2 to 3mm rock fragments range from 15 to 35 percent by volume. In some pedons the C horizon has seggregated lime as coatings on rock fragments or a few soft masses, and is slightly to strongly effervescent.

Plate 51. Ulida loamy coarse sand.

Competing Series: These are the Huntmount, Waucoba, and Waucoba Variant soils. Huntmount are very deep and have a xeric moisture regime. Waucoba has hard rock above 20 inches. Waucoba Variant are skeletal and moderately deep.

Geographic Setting: Ulida soils are on pediments, hills and mountains. Slopes are 2 to 50 percent. The soils formed in residuum from granitic rocks. Elevations are 4000 to 7500 feet. The climate consists of hot dry summers with infrequent thunder showers of short duration; and cool, moist winters. The mean annual precipitation is 8 to 10 inches.

Mean January air temperature is about 35°F; mean July air temperature is about 75°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 235 days.

Geographically Associated Soils: These are the Luckyrich (t), Mexispring (t), Ferroburro (t), Panamint (t) and the competing Huntmount (t) soils. soils. Luckyrich soils developed in alluvium in adjacent valleys. Mexispring, Ferroburro and Panamint lack the argillic horizon. Ferroburro and Panamint have a mollic epipedon and a xeric moisture regime. Mexispring is skeletal.

Drainage and Permeability: Well drained, medium to very rapid runoff, moderately slow permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, recreation, and livestock grazing. The native vegetation consists primarily of big sagebrush (Artemisia tridentata), Utah juniper (Juniperus osteosperma), and scattered perennial grasses.

Series Proposed: Inyo County, California, 1979; Saline Valley Soil Survey.

Remarks: Named derived from Ulida flat in the adjacent Death Valley area.

Upspring Series (1576)

The Upspring series consists of shallow, somewhat excessively drained soils formed in residuum from extrusive igneous rocks. Upspring soils are on hills, mountains, and plateaus and have slopes of 15 to 50 percent. Mean annual precipitation is about 5 inches and mean annual air temperature is about 63°F.

Taxonomic Class: Loamy-skeletal, mixed (calcareous), thermic Lithic Torriorthents.

Typical Pedon: Upspring very stony loam - on a moderately steep plateau under extremely sparse atriplex at 1700 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (8/76) the soil was dry throughout.

45 percent of the surface is paved with 2mm-7cm fragments, 10 percent 7-25cm fragments, and 15 percent 25 to 30cm fragments.

A11 -- 0 to 1 inch; light gray (10YR 7/2) very stony loam, dark grayish brown (10YR 4/2) moist; weak, fine granular structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine tubular and interstitial pores; rock fragments 45 percent 2mm-7cm, 10 percent 7-25cm, and 15 percent 25cm+ (mostly on the surface); strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt smooth boundary. (1 to 2 inches thick)

A12 -- 1 to 6 inches; light gray (10YR 7/2) very stony sandy loam, brown (10YR 4/3) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; rock fragments 2mm-7cm, 45 percent by volume; 7-25cm, 10 percent; and 15 percent 25cm+; violently effervescent with disseminated lime and lime coating rock fragments, moderately alkaline (pH 8.0); clear irregular boundary. (2 to 8 inches thick)

Cca -- 6 to 8 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few fine interstitial pores; rock fragments 50 percent 2mm-7cm, 10 percent 7-25cm; violently effervescent with disseminated lime and lime coating rock fragments, moderately alkaline (pH 8.0); abrupt wavy boundary. (1 to 4 inches thick)

R -- 8 inches; fractured hard basalt.

Location: Inyo County, California, Saline Valley. NW 1/4 of NW 1/4 of Section 14, T. 13 S., R. 38 E., MDBM. About three miles north of the dune road to lower warm springs; at the lower edge of the Saline Range lava flow.

Range in Characteristics: Depth to a lithic contact with hard basalt ranges from 4 to 14 inches. The mean annual soil temperture is about 68°F. These soils are moderately alkaline throughout. The soil contains small ammounts of amorphous material from pyroclastic volcanic rocks. Clay averages 10 to 18 percent from the surface to lithic contact. These soils are dry from June through November; intermittently moist from January through May but never moist more than 90 conscutive days.

The A horizon range in color from light gray to very pale brown (10YR 7/2, 7/3). Textures range from very gravelly to very stony sandy loam with 35 to 70 percent, by volume, rock fragments. The surface 1 to 2 inches often has a very stony loam texture.

The Cca horizon is very pale brown (10YR 7/3). The texture is very gravelly sandy loam, with 35 to 60 percent, by volume, rock fragments.

Competing Series: These are the Beveridge, Blacktop, and Theriot soils. Beveridge and Theriot are carbonatic. Beveridge is frigid. Blacktop and Theriot are mesic.

Geographic Setting: Upspring soils are on plateaus, hills, and mountains. Slopes are 15 to 50 percent. The soils are formed in residuum from extrusive igneous rocks. Elevations are 1600 to 4200 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration, and cool moist winters. The mean annual precipitation is 4 to 6 inches.

Mean January air temperature is about 45°F; mean July air temperature is about 85°F; mean annual air temperature is about 63°F. Frost-free season is 235 to 300 days.

Geographically Associated Soils: These are the Blacktop (t) soils which are mesic.

Drainage and Permeability: Somewhat excessively drained, rapid runoff, moderately rapid permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat and recreation. The native vegetation consists primarily of shadscale (Atriplex confertifolia) and winterfat (Eurotia lanata).

Series Proposed: Inyo County, California; Saline Valley Soil Survey 1979.

Remarks: Name coined from Upper Warm Spring near where the typifying pedon was described.

Waucoba Series (1603)

The Waucoba series consists of shallow, well drained, medium textured soils formed in residuum from metamorphic rocks (Plate 52). Waucoba soils are on hills and mountains and have slopes of 30 to 85 percent. Mean annual precipitation is about 8 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Lithic Haplargids.

Typical Pedon: Waucoba stony loam - on a very steep concave mountain slope, under Mormon tea and spiny hopsage, at 6100 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (7/76) the soil was dry throughout.

The surface has a litter of 15 percent gravel, 10 percent cobbles, and 3 percent stones.

A11 -- 0 to 3 inches; pale brown (10YR 6/3) stony loam, brown (10YR 4/3) moist; moderate thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and common very fine roots; common fine tubular and interstitial pores; rock fragments, 25 percent by volume, 15 percent 2mm-7cm and 10 percent 7-25cm; neutral (pH 7.2); abrupt smooth boundary. (2 to 3 inches thick)

A12 -- 3 to 9 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine and common very fine roots; common fine tubular and interstitial pores; rock fragments, 2mm-7cm, 25 percent by volume; slightly effervescent with disseminated lime, mildly alkaline (pH 7.5); clear wavy boundary. (4 to 7 inches thick)

B2t -- 9 to 15 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, dark yellowish brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, sticky and slightly plastic; few thin clay films on ped faces and lining pores; common fine and few very fine roots; common very fine tubular and interstitial pores; rock fragments, 50 percent by volume, 40 percent 2mm-7cm and 10 percent 7-25cm; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); clear wavy boundary. (5 to 6 inches thick)

B3t -- 15 to 19 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, sticky and slightly plastic; common thin clay films on ped faces and lining pores; few very fine interstitial pores, rock fragments, 60 percent by volume; 50 percent 2mm-7cm and 10 percent 7-25cm; violently effervescent with disseminated lime, moderately alkaline (pH 8.2); abrupt irregular boundary. (3 to 4 inches thick)

R -- 19 inches; highly fractured quartzite with a thin, highly calcareous layer with opal coating the undersides of the fragments and lining some of the vertical cracks.

Location: Inyo County, California, Saline Valley. About 1/2 mile upslope from the abandoned Waucoba tungsten mine. NW corner of Section 28, T. 11 S., R. 37 E., MDBM.

Range in Characteristics: The mean annual soil temperature is about 53 to 59°F. Depth to a lithic contact with hard, fractured rock ranges from 14 to 20 inches. The soil is moist less than 90 consecutive days in which the soil temperature at 20 inches is greater than 41°F. These soils are dry throughout from May through mid November. The soil is neutral to mildly alkaline in the surface and moderately alkaline below.

The A horizon ranges in color from pale brown to light yellowish brown (10YR 6/3, 6/4). Textures are stony or gravelly loam.

The B2 horizon range in color from yellowish brown to brownish yellow (10YR 6/4, 6/6). Textures are very gravelly and very cobbly clay loam and loam. 5mm-25cm rock fragments range from 35 to 75 percent by volume.

The bedrock is fractured and has a thin calcareous layer, with opal coating the undersides of pieces and in vertical cracks.

Plate 52. Waucoba stony loam.

Competing Series: These are the Beveridge, Theriot, Ulida, and Waucoba Variant soils. Beveridge and Theriot lack the argillic horizon and are in a carbonatic family. Beveridge is frigid. Ulida is non-skeletal. Waucoba Variant is moderately deep.

Geographic Setting: The Waucoba soils are on hills and mountains. Slopes are 30 to 85 percent. The soils formed in residuum from metamorphic rocks. Elevations are 5000 to 8000 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration; and cool, moist winters. The mean annual precipitation is 7 to 9 inches.

Mean January air temperature is about 35°F; mean July air temperature is about 75°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 235 days.

Geographically Associated Soils: These are the competing Theriot and Waucoba Variant soils.

Drainage and Permeability: Well, drained, rapid runoff, moderately slow permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, and recreation. The native vegetation consists primarily of big sagebrush (*Artemisia tridentata*), spiny hopsage (*Grayia spinosa*), green Mormon tea (*Ephedra viridis*), and shadscale (*Atriplex confertfolia*).

Series Proposed: Inyo County, California, Saline Valley Soil Survey Area 1979.

Remarks: Name derived from the Waucoba Wash.

Waucoba Variant (1575)

The Waucoba Variant consists of moderately deep, well drained soils developed in residuum from weathered metamorphosed sedimentary rocks (Plate 53). Waucoba Variant soils are on hills and mountains and has slopes of 30 to 75 percent. Mean annual precipitation is about 7 inches and mean annual air temperature is about 53°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Typic Haplargids.

Typical Pedon: Waucoba Variant extremely cobbly fine sandy loam - on a steep convex hillside of northwest aspect, under native vegetation at 6100 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (10/18/78) the soil was dry throughout.

Surface littered with rock fragments: 1 percent stones, 40 percent cobbles, and 20 percent gravel.

A1 -- 0 to 2 inches; pale brown (10YR 6/3) extremely cobbly fine sandy loam, dark brown (10YR 3/3) moist; moderate coarse platy structure; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; many very fine and fine tubular and interstitial pores; 61 percent by volume rock fragments; 1 percent stones, 40 percent cobbles, and 20 percent gravel; moderately alkaline (pH 8.0); abrupt smooth boundary., (1 to 3 inches thick)

B1t -- 2 to 8 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; many very fine tubular and interstitial pores; few thin clay films bridging mineral grains, rock fragments 46 percent by volume; 1 percent stones, 35 percent cobbles, 10 percent gravel; moderately alkaline (pH 8.0); abrupt smooth boundary. (6 to 8 inches thick)

B2tca -- 8 to 15 inches; pink (7.5YR 7/4) very cobbly sandy loam, brown (7.5YR 5/4) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky and nonplastic; common fine and very fine roots; many very fine tubular and interstitial pores; few thin clay films lining pores and bridging mineral grains; 50 percent by volume rock fragments, 40 percent cobbles and 10 percent gravel; strongly effervescent with common fine seams and soft masses of lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (7 to 10 inches thick)

B3t -- 15 to 22 inches; pale brown (10YR 6/3) very cobbly heavy sandy loam, brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; very hard, firm, sticky and slightly plastic; few very fine, fine, and medium roots; common very fine tubular and interstitial pores; common thin clay films on ped faces and lining pores; 45 percent by volume rock fragments, 35 percent cobbles, 10 percent gravel; strongly effervescent with a few fine seams of lime, moderately alkaline (pH 8.0); abrupt irregular boundary. (7 to 9 inches thick)

Cr -- 22 to 23 inches; highly weathered metasedimentary rock; has a few thin clay films extending into the upper part.

Location: Inyo County, California, Saline Valley. W 1/2 of NW 1/4 of Section 9, T. 11 S., R. 37 E., MDBM next to Saline Valley road, northeast side about 250 feet uphill.

Range in Characteristics: Depth to a paralithic contact with weathered metamorphosed sedimentary rock ranges from 20 to 40 inches. The soil is moderately alkaline throughout. Rock fragments range from 35 to 70 percent by volume throughout. The mean annual soil temperature is about 55 to 57°F. These soils are dry from June through mid November.

The A horizon is usually pale brown (10YR 6/3). Textures are very cobbly, and extremely cobbly fine sandy loam and sandy loam. Clay averages about 10 percent.

The Bt horizons are pale brown to pink (10YR 6/3; 7.5YR 7/4). Textures are very cobbly loam to sandy loam. Clay averages 13 to 18 percent.

The Cr horizon consists of highly weathered metasedimentary rock, which slakes when soaked in water. A few clay films extend into the upper part.

Plate 53. Waucoba Variant extremely cobbly fine sandy loam.

Competing Series: These are the Greyeagle Variant, Huntmount, Ulida, and Waucoba soils. Greyeagle Variant soils have a thick, weakly cemented duripan and lack bedrock above 60 inches. Huntmount series have darker surface values, and a xeric moisture regime . Ulida soils are non-skeletal, have darker surface values, and a moisture regime that borders on xeric. Waucoba soils have a lithic contact above 20 inches.

Geographic Setting: Waucoba Variant soils are on steep hills and mountains. Slopes are 30 to 75 percent. The soils formed in residuum from metamorphosed sedimentary rocks. Elevations are 4200 to 6000 feet. The climate consists of hot, dry summers, with infrequent thunder showers of short duration; and cool, moist winters. The mean annual precipitation is 6 to 8 inches.

The mean January air temperature is about 40°F; mean July air temperature is about 80°F; mean annual air temperature is about 53°F. Frost-free season is 185 to 235 days.

Geographically Associated Soils: These are the Cliffdown Variant, Ferroburro Variant, and Theriot soils which are formed from carbonate rocks and lack the argillic horizon, and the competing Waucoba soils. Cliffdown Variant are very deep and nonskeletal. Ferroburro Variant are non-skeletal.

Drainage and Permeability: Well drained, medium runoff, moderate permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, and recreation. The native vegetation consists primarily of Mormon tea (Ephedra Nevadensis) spiny hopsage (Grayia spinosa), spiny horsebrush (Tetradymia axilaris), Cooper's golden bush (Haplopappus Cooperi), and needlegrass (Stipa speciosa).

Xeric Torriorthents (1616)

The Xeric Torriorthents consists of shallow to moderately deep, well drained soils developed in residuum from granitic rocks. They are on hills and mountains and have slopes of 30 to 75 percent. Mean annual precipitation is about 9 inches and mean annual air temperature is about 40°F.

Representative Pedon: Xeric Torriorthents gravelly sandy loam - on a steep convex mountain slope, under native vegetation, at 9800 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (9/76) the soil was moist between 6 and 25 inches.

A11 -- 0 to 2 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist, moderate vesicular structure; hard, friable, nonsticky and nonplastic; many very fine roots; common fine interstitial pores; 2-5mm angular fragments, 25 percent by volume; neutral (pH 7.0); abrupt smooth boundary. (2 to 3 inches thick)

A12 -- 2 to 6 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine interstitial pores; 2-5mm angular fragments, 20 percent by volume; slightly acid (pH 6.5); clear wavy boundary. (4 to 10 inches thick)

C1 -- 6 to 25 inches; light yellowish brown (10YR 6/4) extremely cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; rock fragments, 80 percent by volume, 20 percent 2mm-7cm and 60 percent 7cm-25cm; slightly acid (pH 6.5); gradual wavy boundary. (15 to 27 inches thick)

C2r -- 25 to 30 inches; weathered quartz monzonite, few 1mm cracks, no displacement, no soil material filling cracks.

Location: Inyo County, California. About 1 1/4 miles south southeast of Mount Inyo just east of the crest of the Inyo Mountains at about 36°43'N Lat. and 117°55'W Long.

Range in Characteristics: Depth to a litic or paralithic contact with weathered quartz monzonite ranges from 4 to 40 inches. The mean annual soil temperature is about 42°F. Summer temperature at 20 inches ranges from 55 to 59°F. Reaction is neutral to slightly acid throughout. These soils are moist from May through early August and late October through December.

Surface textures range from gravelly to cobbly sandy loam to loamy sand.

The C horizons consist of very highly fractured and displaced rock. The texture range from extremely cobbly sandy loam to loamy sand. Soil material fills the spaces between the highly displaced fragments. This material grades into weathered or hard quartz monzonite that has very few fractures and no displacement. Soil material does not fill the few cracks.

Competing Series: These are the Beveridge series which have lithic contact at 10 to 20 inches.

Geographic Setting: The Xeric Torriorthents are on hills and mountains. Slopes are 30 to 75 percent. The soils formed in residuum from granitic rocks. Elevations are 8,000 to 11,000 feet. The climate consists of mild, somewhat moist summers, with occasional thunderstorms of short duration; and cold, moist winters. The mean annual precipitation is 8 to 10 inches.

Mean January air temperature is about 30°F; mean July air temperature is about 60°F; mean annual air temperature is aobut 40°F. Frost-free season is 100 to 185 days.

Geographically Associated Soils: These are the Cryoborolls, and Ulida Soils. Both are non-skeletal. Cryoborolls have a mollic epipedon. Ulida soils have a lithic contact at 10 to 20 inches, mesic soil temperature regime, and an argillic horizon.

Drainage and Permeability: Well drained medium to rapid runoff; moderately rapid permeability.

Use and Vegetation: Used mainly for watershed, wildlife habitat, and recreation. The native vegetation is primarily; single needle pinyon (Pinus monophylla), Utah juniper (Juniperus osteosperma), big sagebrush (Artemisia tridentata), very widely scattered limber pine (Pinus flexilis), spiked fescue (Hesperchloa kingii), and june grass (Koelaria christata).

Yellowrock Series (1000)

The Yellowrock series consists of very deep, somewhat excessively drained, sandy soils formed in alluvium from mixed sources. Yellowrock soils are on alluvial fans and flood plains and have slopes of 0 to 15 percent. Mean annual precipitation is about 5 inches and the mean annual air temperature is about 65°F.

Taxonomic Class: Sandy, mixed, thermic Typic Torriorthents.

Typical Pedon: Yellowrock very gravelly loamy sand - on a 2 percent slope under creosote bush at 1300 feet elevation. (Colors are for dry soil unless otherwise stated.) When described (6/76) the soil was dry throughout.

70 percent of the surface is covered with a layer of gravel 2mm to 3cm.

A1 -- 0 to 3 inches; pale brown (10YR 6/3) very gravelly loamy sand, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; 2mm-2cm pebbles, 60 percent by volume; many very fine interstitial pores; violently effervescent with disseminated lime, moderately alkaline (pH 8.2); abrupt smooth boundary. (1 to 5 inches thick)

C1 -- 3 to 10 inches; light brownish gray (10YR 6/2) gravelly loamy coarse sand, grayish brown (10YR 5/2) moist; weak medium granular structure; soft, very friable nonsticky, nonplastic; 2mm-1cm pebbles, 15 percent by volume; many very fine interstitial pores; violently effervescent with disseminated lime, moderately alkaline (pH 8.5); clear wavy boundary. (2 to 7 inches thick)

IIC2 -- 10 to 19 inches; light brownish gray (10YR 6/2) loamy sand, contains numerous 2mm-10mm lenses of sand, gravelly sand, and gravelly loamy sand; grayish brown (10YR 5/2) moist; massive; loose, nonsticky and non-sticky and nonplastic; few fine roots; many very fine interstitial pores; 2mm to 1cm pebbles, 10 percent by volume; violently effervescent with disseminated lime, moderately alkaline (pH 8.0); clear wavy boundary. (2 to 7 inches thick)

IIIC3 -- 19 to 24 inches; pale brown (10YR 6/3) gravelly loamy sand, contains thin lenses of very gravelly loamy sand and sand; brown (10YR 5/3) moist; single grained; loose, nonsticky and nonplastic; many very fine interstitial pores, 2mm to 1cm pebbles, 15 percent by volume; violently effervescent with disseminated lime, moderately alkaline (pH 8.3); gradual wavy boundary. (4 to 12 inches thick)

IVC4 -- 24 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; massive; loose, nonsticky nonplastic;

common very fine interstitial pores; 2mm-2cm gravels, 35 percent by volume; violently effervescent with disseminated lime, moderately alkaline (pH 8.2).

Location: Inyo County, California, Saline Valley, NE 1/4 of SE 1/4 of Section 36, T. 14 S., R. 38 E., MDBM.

Range in Characteristics: The soils are slightly to strongly effervescent below one inch and moderately alkaline throughout. The mean annual soil temperature ranges from approximately 68°F to 70°F. Clay averages 5 to 10 percent and rock fragments average 15 to 35 percent, by volume, in the control section. Some thin lenses contain 35 to 60 percent gravel. These soils are dry from May through November. The soils are moist in some part from mid March through April.

The color of the A horizon ranges from light gray, light brownish gray and pale brown to very pale brown (10YR 7/1, 7/2, 6/2, 6/3, 6/4, 7/3). Textures are loamy fine sand, very gravelly loamy sand, or very bouldery loamy sand. Rock fragments 2mm-7cm range from 0 to 50 percent; 7-25cm, 0 to 10 percent; and 25cm+, 0 to 20 percent.

Textures in the C horizon are similar to those of the A. Colors are similar also, but differences between layers indicate frequent deposition. The textural class in the 10 to 40 inch zone averages sand to loamy sand. The C horizon tends to be stratified with thin lenses of sand, gravelly sand and loamy sand.

Competing Series: These are the Arizo and Bluewing, soils which are skeletal. Bluewing is mesic.

Geographic Setting: Yellowrock soils are on alluvial fans and flood plains. Slopes are 0 to 15 percent. The soils formed from alluvium of mixed sources. Elevations are 1200 to 2500 feet. The climate consists of hot dry summers with infrequent thunder showers of short duration, and mild, moist winters. The mean annual precipitation is 4 to 6 inches. Mean January air temperature is about 45°F; mean July air temperature is about 90°F. Mean annual air temperature is about 65°F. Frost-free season is about 300 days.

Geographically Associated Soils: These are the Arizo, Bluewing, Cliffdown, and Yermo soils. Cliffdown and Yermo are loamy-skeletal. Bluewing and Arizo are sandy-skeletal. Bluewing and Cliffdown are mesic.

Drainage and Permeability: Somewhat excessively drained; slow runoff; rapid permeability.

Use and Vegetation: Used mainly for wildlife habitat and recreation. Natural vegetation consists of creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), and desert holly (*Atriplex hymenelytra*).

Series Proposed: Inyo County, California; Saline Valley Soil Survey 1979.

Remarks: Name derived from a local landmark.

Yellowrock Variant (1008)

The Yellowrock Variant consists of very deep, somewhat poorly drained soils formed from mixed lacustrine alluvium. Yellowrock Variant soils occupy basin rim positions and have slopes of 0 to 2 percent. Mean annual precipitation is about 4 inches and mean annual air temperature is about 70°F.

Taxonomic Class: Coarse-loamy, mixed, hyperthermic Fluventic Haplustolls.

Typical Pedon: Yellowrock Variant loam - on a nearly level basin rim under natural vegetation at 1100 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (8/76) the soil was slightly moist below 2 inches.

Surface 1cm capped by a brittle salty crust.

A11sa -- 0 to 2 inches; grayish brown (10YR /2) loam, very dark grayish brown (10YR 3/2) moist; strong medium platy struture; extremely hard, extremely firm, slightly sticky and slightly plastic; few very fine roots; many very fine and fine interstitial pores; slightly effervescent with disseminated lime, strongly alkaline (pH 8.5); abrupt smooth boundary. (1 to 2 inches thick)

A12 -- 2 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine interstitial pores; strongly effervescent with disseminated lime, moderately alkaline (pH 8.2); abrupt irregular boundary. (6 to 8 inches thick)

C1 -- 8 to 14 inches; light brownish gray (2.5Y 6/2) gravelly fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine interstitial pores; 2mm to 5mm pebbles, 20 percent by volume; violently effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (3 to 5 inchs thick)

C2 -- 14 to 18 inches; light brownish gray (2.5Y 6/2) gravelly fine sandy loam grayish brown (2.5Y 5/2) moist; massive; very hard, friable, slightly sticky and slightly plastic; common fine interstitial pores; 2mm to 5mm pebbles, 20 percent by volume; violently effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (3 to 5 inches thick)

IIA1sacab -- 18 to 24 inches, brown (7.5YR 4/2) silt loam, dark reddish brown (5YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine old slightly decomposed roots; few very fine interstitial pores; strongly effervescent with lime as a few soft masses, strongly alkaline (pH 8.5); clear wavy boundary. (4 to 7 inches thick)

IIC3b -- 24 to 28 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; few, fine, distinct brown (7.5YR 4/4) mottles; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine interstitial pores; violently effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (3 to 5 inches thick)

IIA1b -- 28 to 31 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few, fine, old, slightly decomposed roots; few very fine interstitial pores; strongly effervescent lime, moderately alkaline (pH 8.0); clear wavy boundary. (9 to 15 inches thick)

IIC4cab -- 31 to 43 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine interstitial pores; violently effervescent with few, fine soft masses of lime, moderately alkaline (pH 8.0); abrupt wavy boundary. (10 to 15 inches thick)

IIIC5b -- 43 to 60 inches; light brownish gray (2.5Y 6/2) very gravelly sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, slightly sticky and nonplastic; few coarse and medium interstitial pores; 2-5mm pebbles, 40 percent by volume; slightly cemented by finer material; violently effervescent with disseminated lime, moderately alkaline (pH 8.0).

Location: Inyo County, California, Saline Valley. NE 1/4 of NW 1/4 of Section 15, T. 14 S., R. 38 E., MDBM about 1/4 mile east of the main road and Fred Story Mine driveway.

Range in Characteristics: The mean annual soil temperature is about 72°F. The soils are dry for 90 to 100 cumulative days, but never dry more than 45 consecutive days. The soil moisture control section is moist due to groundwater capillarity. The soil profile is made up of a series of buried soil profiles that resulted from the periodic deposition of lacustrine and alluvial material over a long period.

The A horizon is usually divided into more than one layer. Colors range from grayish brown to dark grayish brown (10YR 5/2, 4/2). Textures are fine sandy loam and loam. Organic matter content is estimated to be from 3 to 8 percent in all or part of the A horizon and always greater

than 1 percent. The percentage of organic matter decreases irregularly with depth. The surface is a 1cm crust of silty material that is strongly saline-alkali. The upper 1-2 inches are strongly alkaline, but the rest of the profile is moderately alkaline.

The C horizon ranges in color from light brownish gray to light yellowish brown (2.5Y 6/2, 6/4). The texture is generally fine sandy loam. The lower layer of the C horizon is usually slightly cemented and gravelly, with 15 to 35 percent 2-5mm pebbles. The C horizon often has a few distinct reddish mottles.

The soil profile at the surface overlays similar soil profiles that have textures ranging from silt loam to very fine sandy loam. Some of these profiles have 4 to 20 inch thick layers of hard to very hard, slightly cemented gravelly to very gravelly loam and sandy loam.

Competing Series: These are the Yellowrock series. Yellowrock soils have an aridic moisture regime, are sandy, and have a thermic soil temperature regime.

Geographic Setting: Yellowrock Variant soils occupy basin rim positions. Slopes are 0 to 2 percent. The soils formed from mixed lacustrine alluvium. Elevations are 1010 to 1250 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration, and cool, moist winters. The mean annual precipitation is 4 inches.

Mean January air temperature is about 50°F; mean July air temperature is about 95°F; mean annual air temperature is about 70°F. Frost-free season is greater than 320 days.

Geographically Associated Soils: These are the competing Yellowrock soils.

Drainage and Permeability: Somewhat poorly drained, very slow runoff, moderate permeability.

Use and Vegetation: Used mainly for wildlife habitat. The natural vegetation consists primarily of arrow weed (*Pluchea sericea*), pickleweed (*Allenrolfea oxidentalis*) and screwbean mesquite (*Prosopis pubescens*)

Yermo Series (1003)

The Yermo series are very deep, well drained soils formed in mixed alluvium. Yermo soils are on alluvial fans and have slopes of 5 to 15 percent. Mean annual precipitation is about 6 inches and the mean annual air temperature is about 63°F.

Taxonomic Class: Loamy-skeletal, mixed (calcareous), thermic Typic Torriorthents.

Typical Pedon: Yermo very gravelly loam - on an alluvial fan of 9 percent slope under native vegetation at 2,600 feet elevation. (Colors are for dry soil unless otherwise noted.) When described (8/76) the soil was dry throughout.

60 percent of the surface is paved by 2mm to 25cm fragments coated with desert varnish; 50 percent 2-70mm, 5 percent 7-25cm, 5 percent 25cm.

A1 -- 0 to 4 inches; light brownish gray (10YR 6/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine interstitial and vesicular pores; rock fragments 50 percent by volume 2-70mm, 5 percent 7-25cm, 5 percent 25cm+; slightly effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt smooth boundary. (2-6 inches thick)

C1 -- 4 to 9 inches; very pale brown (10YR 7/3) gravelly loam, brown (10YR 5/3) moist; weak fine granular structure; slightly hard, very friable, nonsticky and slightly plastic; common coarse and fine roots; common fine interstitial pores; 2mm-70mm pebbles, 30 percent by volume; strongly effervescent with disseminated lime, moderately alkaline (pH 8.0); clear irregular boundary. (4 to 6 inches thick)

C2 -- 9 to 17 inches; very pale brown (10YR 7/3) very gravelly loam, brown (10YR 5/3) moist; weak fine and medium granular structure; slightly hard, very friable, nonsticky and slightly plastic; common fine and few medium roots; common fine interstitial pores; 2-70mm fragments, 20 percent by volume, 15 percent 7-25cm; violently effervescent with disseminated lime, moderately alkaline (pH 8.0); clear wavy boundary. (4 to 8 inches thick)

C3 -- 17 to 30 inches; very pale brown (10YR 7/3) very gravelly loam, brown (10YR 5/3) moist; weak fine and medium granular structure; slightly hard, very friable, nonsticky and slightly plastic; common coarse and medium and many fine roots; common fine interstitial pores; 2 to 70mm fragments measured, 30 percent by volume, 7-25cm measured, 5 percent; violently effervescent with disseminated lime, moderately alkaline (pH 8.0); clear wavy boundary. (10 to 18 inches thick)

C4 -- 30 to 60 inches; very pale brown (10YR 7/3) very gravelly loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; common fine and few medium roots; few fine interstitial pores; 2 to 70mm fragments, 25 percent by volume, 10 percent 7-25cm; violently effervescent with disseminated lime, moderately alkaline (pH 8.0).

Location: Inyo County, California, Saline Valley. NE 1/4 of NW 1/4 of Section 26, T. 12 S., R. 37 E., MDBM. About 10 feet west of the Saline Valley Road.


Plate 54. Yermo very gravelly loam.

Range in Characteristics: The mean annual soil temperature is about 65°F. Reaction is moderately alkaline throughout. These soils are dry throughout from June through November. The textural control section averages 35 to 40 percent rock fragments and 10 to 18 percent clay.

The A horizon ranges in color from very pale brown to light brownish gray and pale brown (10YR 7/3, 7/2, 6/2, 6/3). Textures are usually very gravelly fine sandy loam, or very gravelly loam.

The C horizon is pale brown to light brownish gray (10YR 7/3, 6/2). Textures are very gravelly loam and very gravelly sandy loam.

Competing Series: These are the Arizo, Bluewing, and Cliffdown series. Arizo soils are sandy. Bluewing soils are sandy and have a mesic soil temperature regime. Cliffdown soils have a mesic soil temperature regime.

Geographic Setting: Yermo soils are on alluvial fans. Slopes are 5 to 15 percent. The soils formed in mixed alluvium. Elevations are 2,000 to 4,100 feet. The climate consists of hot, dry summers with infrequent thunder showers of short duration, and cool, moist winters. The mean annual precipitation is 4 to 8 inches.

Mean January air temperature is about 45°F; mean July air temperature is about 85°F. The mean annual air temperature is about 63°F. Frost-free season is about 235 days.

Geographically Associated Soils: These are the Yellowrock (t), Arizo, and Luckyrich (t). Luckyrich are mesic and average fewer than 35 percent rock fragments. Yellowrock have a sandy textural control section and average fewer than 35 percent rock fragments. Arizo is sandy-skeletal.

Drainage and Permeability: Well drained, medium runoff, moderately rapid permeability.

Use and Vegetation: Used mainly for wildlife habitat and recreation. The native vegetation consists primarily of creosote bush (*Larrea tridentata*), and burro bush (*Ambrosia dumosa*).

Formation of the Soils

In this section, the factors that effect the formation of soils in the Saline Valley area are discussed and the major processes of soil formation are described.

Factors of Soil Formation

Soil is a natural body on the surface of the earth in which plants grow; it consists of organic and mineral material. Soils differ in their appearance, composition, productivity, and management requirements in different localities or even within short distances in the same locality. The factors that cause soils to differ are (1) physical and chemical composition of the parent material; (2) the climate under which the soil material has accumulated and existed since accumulation; (3) biological forces; (4) relief, or lay of the land; and (5) length of time the forces of formation have acted on the soil material. Relative importance of each factor differs from place to place, but generally, interaction of all the factors determines the kind of soil that forms in any given place. The influence of each soil-forming factor on soils in the Saline Valley area is described in the pages that follow.

Parent Material:

Parent material is the weathered rock or unconsolidated material from which soils form. The hardness, grain size, and porosity of the parent material and its content of weatherable minerals greatly influence formation of soils. There are four main sources of parent material in the Saline Valley, (1) younger alluvium and lacustrine deposits, (2) older, semi-consolidated alluvium, (3) eolian materials, and (4) rock. Much of the area is represented by soils developed from alluvial material that was transported from the fringing mountains during the late Pleistocene Epoch. This material ranges in texture from gravelly and cobbly loam on the older upper fans, to gravelly and cobbly sand in the stream wash areas.

Recent Alluvium and Lacustrine Deposits - This material consists of relatively unweathered sediments of mixed origin deposited during recent geologic time in channels and on fans, flood plains, and basins. Mean particle size and degree of sorting by particles sizes reflect, in a general way, conditions of deposition, distance of transport, and turbulence, velocity and density of flow. Alluvium of the higher alluvial fans around the margin of the valley tends to be relatively coarse and poorly sorted, as is the alluvium flooring the numerous stream washes debouching from the mountainous rim into the valley. The Yellowrock and Arizo are two of the soils that developed on these recent fan deposits. On lower slopes and valley floor, the alluvium is finer textured and better sorted as a result both of greater distance of transport and changing flow characteristics of the transporting medium. In the lowest regions of the valley and in smaller, intermontane basins, water frequently collects and forms shallow ephemeral lakes of varying size. here the finest textured and best sorted materials accumulate as lacustrine deposits. The Bunkerhill, and Yellowrock Variant soils as well as the playas and salt flats formed from materials deposited in these environ-
ments.

Older Alluvium from Mixed Sources - This material is similar to gravelly and cobbly recent alluvium, but soils formed from this material have had longer to develop and usually contain diagnostic subsurface horizons like argillic horizons or duripans. The Arizo Variant and Greyeagle soils have formed from older semiconsolidated alluvium. The Greyeagle soils occupy the remmants of older alluvial fans which may have been covered by more recent alluvial material, then the recent material was eroded along with some of the older fan, leaving a very shallow soil cut by many intersecting drainage ways. The Arizo Variant soils have formed in a similar manner but are found on the higher ridges of the older fans surrounded by drainage ways and younger alluvium.

Eolian Materials - Sand dunes characterize the major eolian areas.Wind has blown material from the playa and nearby alluvial fans, removed the

fines, and deposited the heavier sands. Winds continue to rework the dunes, but some areas have been partially stabilized by plant cover.

Rock - There are several categories of rock from which major soils in the Saline Valley area have formed.

Basalt - The soils forming from the basalt of the Pleistocene lava flows are found on the plateau of the Saline Range. Most of these soils are shallow, and medium textured, with many rock fragments of fractured basalt. The Upspring and Blacktop soils are forming from basalt. Under more humid climatic basalts weather to form fine textured soils; under arid climates, weathering is slower and soils do not form as fast.

Granitic Rocks - The soils formed from the Mesozoic granitic rocks tend to be medium to coarse textured due to the high percentage of unweathered quartz. Examples are the Cryoborolls, Ferroburro, and Mexispring soils.

Sedimentary rocks - There are several types and ages of limestones and calcareous shales in the Saline Valley area. The soils formed from these vary in thickness, number and kind of diagnostic layers, but are usually medium textured and contain many rock fragments. The Beveridge and Theriot soils have formed from limestone and calcareous shales.

Mixed Metamorphic Rocks - Quartzites are the most common metamorphic rocks in the survey area. They form soils with coarse textured surfaces containing many rock fragments, because quartzite does not weather easily, and usually only breaks into smaller pieces. The Waucoba and Waucoba Variant soils are forming from metamorphosed rocks.

Climate

In the Saline Valley area, the summers are hot with infrequent thunder showers. The winters are cool and slightly moist. Most of the scanty precipitation falls during the period December to February. The soils may be moist for a short time, less than 90 days, but only to depths of 30 inches or less in the medium to moderately coarse textured soils. The exceptions are the higher mountain areas that receive snowfall, which may remain until late March to early June on north slopes in the higher elevations.

In the valley, growth of shrubs, grasses and forbs, is rapid in the spring, but their activity is severely reduced with the coming of hot weather and the exhaustion of the limited supply of soil moisture. A similar growth pattern occurs in the mountains, but the decline of activity occurs later in the spring due to the lower average daily air temperatures at the higher elevations, and the greater amount of available water. Snow melt during the late spring in the higher elevations causes moisture to be available to the plant during the late spring through early summer.

The sparse cover of plants combined with the rapid oxidation of organic matter during hot summers and the limited growth period in the valley permit little accumulation of organic matter. Consequently, all but the somewhat poorly drained basin soils are lower in organic matter than the soils of the high mountains to the west.

The mean annual precipitation increases from the valley floor to the north and west. The range is from about 4 inches in the center of the valley to 6 inches on the outer edges and eastern mountains, increasing to 8 to 10 inches in the north and west mountainous areas. The present limited amounts and range in precipitation do not show many significant differences in most soils in the valley because they are forming under the present climate. However, the older, developed soils may have formed under an earlier, wetter climate.

Mean annual air temperature ranges from about 60 to 72°F in the valley and eastern mountains to about 40 to 60°F in the mountainous portion. The range of temperatures in the survey area varies, and results in taxonomic differences in soils.

Soils that are forming under the influence of the arid climate of the valley have light colored, granular or vesicular, moderately alkaline surfaces, and massive, moderately alkaline substrata. The older soils on the high fans and terraces have moderately alkaline profiles with developed subsurface layers. This suggests that these soils have been subject to soil forming processes since the early Pleistocene Epoch or some previous time when the climate may have been more humid.

In the higher elevations, the effects of higher precipitation and lower temperatures are evident in the vegetation and the soils. Woody and herbaceous vegetation is increasingly abundant, and organic matter in the soils increases from low to moderate. A darker colored surface replaces the very light ones of the valley. Other results are greater soil depth and more distinct subsurface horizonation.

Biological Forces

Vegetation is the dominant among the biotic agents that effect soil formation in the Saline Valley area. Also considered among biological forces are animals, insects, bacteria, and other organisms. They add or concentrate organic matter in the soil and stir and aerate it. Their activity, however, depends in large part upon the vegetation that grows in the soil and provides their food.

On the somewhat poorly drained fringes of the playa, the heavy growth of vegetation provides the organic matter that gives the Yellowrick Variant its dark color.

In the mountain areas, the plant cover changes with increasing precipitation and cooler soil temperatures. Big sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus spp.*) dominate some of the

lower mountainous areas. As elevation and precipitation increase, pinion pine (Pinus monophylla) and Utah juniper (Juniperus osteosperma) add to the composition. The more abundant the vegetation, the darker the soil and the better the surface structure tends to be which, in turn, provides a good medium for plant growth. This trend can be reduced through the effects of fire, overgrazing and off-road vehicles. Excessive trampling by grazing animals or vehicle traffic packs the surface. As a result, more water runs off than penetrates the soil and plant growth is inhibited. In the higher mountains, winter cycles of freezing and thawing may help break up packed surface soil.

Relief

Relief, through its effects on drainage, erosion, and aspect, has had an important effect on soil development in the Saline Valley area. For example, the basin is totally enclosed by surrounding mountains, and under natural conditions has no outlets for surface and subsurface waters. As a result, basin soils accumulate salts that have been brought in by water draining from the surrounding mountains. As this water evaporates from the upper layers of the soil, the salts are left behind.

Recent and older fans cover large areas of the valley. They are gently to strongly sloping. Some have depressions formed by wind scouring, or more frequently, have been dissected by stream action. Soils on most fans have not been affected by the water table. Some older fans have been more affected by channel erosion as evidenced by a more intricate pattern of channels and washes. These older fans tend to be undulating, with adequate surface drainage. Water may pond for short periods in low areas or on soils with duripans or denser argillic horizons at shallow a depth. If these soils are on sloping surfaces, runoff may be quite high and result in increased surface erosion. Because of erosion, some fans have steep escarpments along deeply incised stream channels.

On the very steep mountain slopes, erosion removes the surface soil nearly as fast as it forms. In the lower mountains, slopes are very steep. Erosion has left these areas nearly devoid of soil and most vegetation. These areas are highly dissected parent material.

Monoclinic block faulting of the lava flow area in the central portion of the survey area has left steep escarpments on the western edges of blocks, and a gently sloping to strongly sloping plateau-form on the eastern side. Soils on these lava flows form slowly and are influenced mainly by parent material which effects the texture of the soil formed and climate which effects the length of time it takes for them to form.

Aspect, or the direction a slope faces, becomes increasingly important in the steep hills and higher mountains. It has important effects upon

the microclimate of developing soils. Direction and slope of the soil determine, in part, the amount of total heat energy per unit area that is absorbed from the sun. Several degrees' difference in the average summer temperature of the soil at a depth of 20 inches on adjoining north and south facing slopes can be critical in determining soil characteristics and plant growth. For example, soils on north slopes at elevations above 8,000 feet have a mean summer temperature several degrees cooler than those on south facing slopes at the same eleveation.

Time

The effect of time on soil formation can be somewhat subtle unless one studies the stratigraphy and geomorphology of an area. A study of stratigraphy of the alluvial fans and flood plains, with a comparison of soil profiles makes it possible to estimate the relative age of some of the soils. The relative position of various fans and terraces indicates, to a degree, their comparative ages. In general, the lowest stream bottoms consist of the most recent alluvium and the highest terraces or fans consist of the oldest alluvium.

Plate 55. Dense desert pavement coated with desert varnish on the Arizo Variant soils indicates its relatively stable landform position.

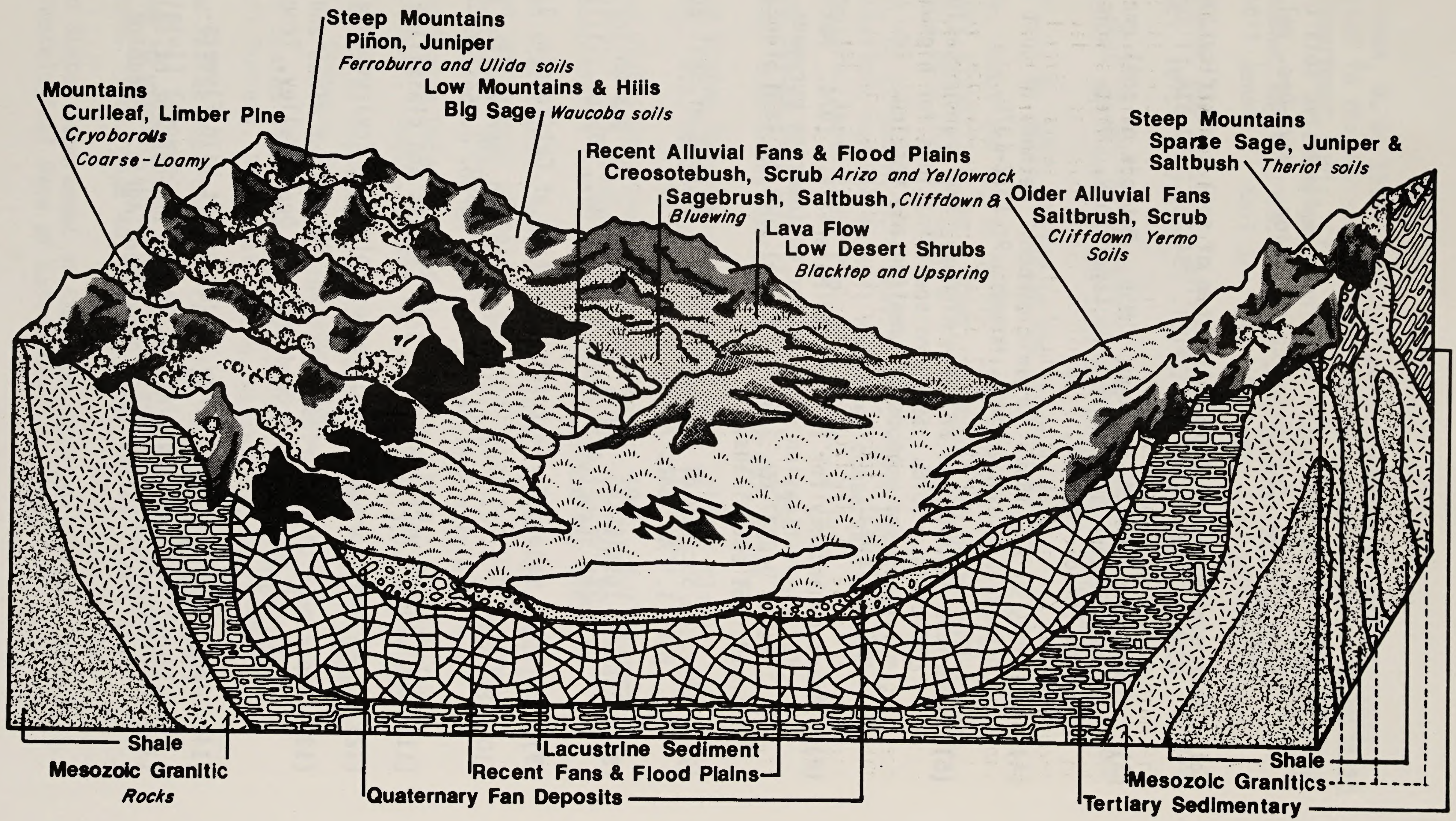
The highest fans are composed of mixed cobbles and gravel coated with desert varnish from which the Arizo Variant (Plate 55), Osobb, Greyeagle, and the Greyeagle Variant formed. These soils have had translocation of clay and/or lime-silica, and have formed argillic horizons or duripans.

The next lower fans also consists of mixed gravelly and cobbly alluvium. The soils on those fans have less pronounced horizon development, some movement of carbonates and weathering of the soil material has formed underlying layers with structure. The Cliffdown and Yermo soils contain horizons with week structure, indicating a shorter time of formation and lesser degree of stabilization than soils on the higher fans. As these soils mature over time, their characteristics will develop more strongly.

The most recent alluvial deposits, other than the actual stream washes, are found in the lowest landscapes and usually contain fewer cobbles and gravel and more fine sand, silt, or clay. The sediments were deposited on a gentle gradient, and proceeding downslope, soil development is progressively less distinct. The Yellowrock soils formed in younger sediments. A study of the stratigraphy of basin and basin rim soils shows the frequent, sequential deposition of new alluvial material on top of previously, weakly developed soils. Yellowrock Variant shows this with its repeating sequence of buried "A/C" profiles. Increased sodium concentrations in each of the "A" horizons coupled with decreasing concentrations in the lower "C" horzons shows that the buried "A" horizons were, in fact, once on the surface; the residual sodium arrived in those "A" horizons due to upward water capillarity. Concentrations of organic matter provide further evidence.

Figure 1 shows some of the relationships between parent material, topography, vegetation and soil.

Fig. 1 SOIL-VEGETATION-LANDFORM RELATIONSHIPS



References

(1) Aandahl, Andrew R. 1965. The first comprehensive soil classification system. Soil Water Conservation. Nov.-Dec. vol. 20, 6: 243-246.

(2) Abercrombie, W. F. 1954. A system of soil classification. Highway Res. Board Proc. Publ. 234, pp. 590-514, illus.

(3) Alban, L. A. and M. Kellogg. 1959. Methods of soil analysis as used in the OSC Soil Testing Laboratory. Oreg. Agric. Exp. Stn. Misc. Pap. 65, 9 pp.

(4) Allison, L. E. 1965. Organic carbon. Methods of soil anslysis, part 2. Am. Soc. Agron. Monogr. 9: 1372-1376.

(5) American Association of State Highway (and Transportation) Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.

(6) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. In 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(7) American Society of Agronomy. 1965. Methods of soil analysis, part I. Am. Soc. Agron. Publ., 770 pp.

(8) Asphalt Institute. 1969. Soil manual - for design for asphalt pavement structures. College Par, Md., 265 pp., illus.

(9) Barbour, Major; Terrestrial Vegetation of California, 1977

(10) Bouyoucos, G. J. 1962. Hydrometer method improved for making particle size analyses of soils. Agron. J. 54: 464-465.

(11) Buol, Hole, McCracken 1973, Soil Genesis and classification.

(12) Cooke and Doorncamp 1976; Geomorphology in Environmental Planning.

(13) Department of Resources, California Bureau of Mines and Geology. 1: 250,000 Geologic Quadrangles. Death Valley, Trona, Fresno sheets.

(14) Jaeger, E. C. 1941. (Rev. 1976) Desert Wild Flowers.

(15) Richards, L. A. 1954. Diagnosis and improvement of saline and alkali soils. U.S. Department Agric. Handbook 60, 160 pp., illus.

(16) Robinson, W. O. 1930. Methods and procedures of soil analysis used in the division of soil chemistry and physics. U.S. Department Agric. Circ. 139, 18 pp. (Revised November 1939).

(17) Simonson, Roy W. 1959. Outline of a generalized theory of soil genesis. Soil Sci. Soc. Am Proc. 23: 152-156, illus.

(18) Simonson, Roy W. 1962. Soil classification in the United States. Sci. 137: 1027-1034.

(19) Soil Science Society of America and American Society of Agronomy. 1966. Soil Surveys and Land Use Planning. 196 pp., illus.

(20) Spock, L. E. 1962. Guide to the Study of Rocks.

(21) Thorp, James and Guy D. Smith. 1949. Higher categories of soil classification: order, suborder, and great soil groups. Soil Sci. 67: 117-126.

(22) Uhlnd, R. E. and A. M. O'Neal. 1951. Soil permeability determinations for use in soil and water conservation. Soil Conserv. Serv. Tech. Pap. 101, 36 pp., Illus.

(23) United States Department of Agriculture. 1938. Soils and men. U.S. Dept. Agric. Yearb., 1232 pp., illus.

(24) United States Department of Agriculture. 1941. Climate and man. U.S. Department Agric. Yearb., 1238 pp., illus.

(25) United States Department of agriculture. 1951. Soil survey manual. U.S. Department Agric. Handb. 18, 503 pp., illus. (Supplements replacing pp. 173-188 issued May 1962).

(26) United States Department of Agriculture. 1954. Diagnosis and improvement of saline and alkali soils. U.S. Department Agric. Handb. 60, 160 pp., illus.

(27) United States Department of Agriculture. 1960. engineering handbook. Suppl. a, sec. 4, Hydrol., pp. 3.7-1 to 3.7-3.

(28) United States Department of Agriculture. 1975. Soil Taxonomy; Soil Conserv. Serv. Ag. Handbook 436.

(29) United States Department of Agriculture. 1964. Hydrology. Soil Conserv. Serv. Nat'l. Eng. Handb., sec.4.

(30) United States Department of Commerce, Weather Bureau. 1961. Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years. Tech. pap. 40, 115 pp., illus.

(31) United States Department of Commerce, Weather Bureau. 1951-1971. Climatological Data of California (monthly).

Glossary:

ABC soil: A soil having A, B, and C horizons.

AC soil: A soil having only A and C horizons. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil: The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil: Many fine partices held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil: A soil having such a high degree of alkalinity (ph 8.5 or higher), or such a high percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium: Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim: An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon: A diagnostic illuvial subsurface horizon characterized by an accumulation of silicate clays.

Association, soil: A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity): The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in the effective rooting depth or to a limiting layer is expressed as --

	Inches
Very low	0 - 3
Low	3 - 6
Moderate	6 - 9
High	more than 9

Badland: Steep or very steep, commonly nonstony barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and erosion is active.

Bahada: An apron of connecting or laterally intersecting Alluvial fans at the bases of mountains or hills.

Base saturation: The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedrock: The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout: A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Boulders: Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil: A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Cambic horizon: An horizon which has been altered or changed by soil-forming processes.

Capillary water: Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation: An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity: The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay: As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film: A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse fragments: Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse loamy: A textural class in which, by weight 15 percent or more of the particles are fine sand or coarser, including fragments up to 7.5cm in diameter, and with less than 18 percent clay in the fine-earth fraction.

Coarse textured (light textured) soil: Sand or loamy sand.

Cobblestone (or cobble): A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium: Soil material, rock fragments, or both moved by creep, slide or local wash and deposited at the bases of steep slopes.

Complex slope: Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil: A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible: Excessive decrease in volume of soft soil under load.

Concretions: Grains, pellets, or nodules of various sizes, shapes and colors consiting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil: The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are --

Loose: Noncoherent when dry or moist; does not hold together in a mass.

Friable: When moist, crushes easily under gently pressure between thumb and forefinger and can be pressed together into a lump.

Firm: When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic: When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky: When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other materials.

Hard: When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft: When dry, breaks into powder or individual grains under very slight pressure.

Cemented: Hard; little affected by moistening.

Consociation: A group of polypedons of one series. See polypedon.

Control section: The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 to 80 inches (1 or 2 meters).

Corrosive: High risk of corrosion to uncoated steel or deterioration of concrete.

Cutbanks cave: Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Cryic: A soil temperature regime where mean annual soil temperature is less than 47° and mean summer temperature is less than 59°F.

Depth to rock: Bedrock at a depth that adversely affects the specified use.

Drainage class (natural): refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized.

Excessively drained: Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained: Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained: Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained: Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly impervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained: Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained: Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained: Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats and climatic moors".

Drainage, surface: Runoff, or surface flow of water, from an area.

Duripan: A hard layer or horizon in a soil that has been cemented by materials such as silica and calcium carbonate.

Electrical conductivity: The electrical conductivity of natural waters. The conductivity of water is affected by salt concentration, dissociation of the salts, kind of exchangeable cations, and temperature. Thus, it is possible to approximate the salt content of soil moisture by making reasonable assumption regarding degree of dissociation of the salts and the kind of exchangeable cations present and appropriate adjustments for temperature.

Eluviation: The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have recieved material are ailluvial.

Eolian soil material: Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion: The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes such as gravitational creep.

Erosion (geologic): Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated): Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Erosion pavement: A layer of gravel or stones that remains on the ground surface after fine particles are removed by wind or water. Desert pavements result from wind erosion in arid areas.

ESP (exchangeable-sodium percentage): The degree to which the absorption complex of a soil is occupied by sodium.

Excess alkali: Excess exchangeable sodium. The resulting poor physical properties restrict the growth of plants.

Excess fines: Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime: Excess carbonates. Excessive carbonates, or lime, restrict the growth of some plants.

Excess salts: Excess water soluble salts. Excessive salts restrict the growth of some plants.

Fast intake: The rapid movement of water into the soil.

Favorable: Favorable soil features for the specified use.

Fertility, soil: The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity: The moisture content of a soil, expressed as a percentage of the oven dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

Fine-loamy: A textural class in which, by weight, 15 percent or more of the paricles are fine sand or coarser, including fragments up to 7.5cm in diameter, and with 18 through 34 percent clay in the fine-earth fraction.

Fine textured (heavy textured) soil: Sandy clay, silty clay, and clay.

Flooding: The temporary covering of soil with water from over flowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. None means that flooding is not probable, rare that it is unlikely but possible under unusual weather conditions; occasional that it occurs on an average of once or less in 2 years; and frequent that it occurs on an average of more than once in 2 years. Duration is expressed as very brief if less than 2 days, brief if 2 to 7 days, and long if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain: A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope: The inclined surface at the base of a hill.

Forb: Any herbaceous plant not a grass or a sedge.

Fragmental: A textural class dominated by stones, cobbles, gravel, and very coarse sand particles and with too little fine earth to fill interstices larger than 1mm in diameter.

Frigid: A soil temperature regime where the mean annual soil temperature is less than 47°F.

Genesis, soil: The mode of origin of the soil. Refers expecially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gravel: Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material: Material from 15 to 50 percent by volume, rounded or angular rock fragments, no prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology): Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Gully: A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully an a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Habitat: The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Hardpan: A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil: A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon: An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon: The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon: A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon: The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon: The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer: Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky: Refers to a landscape of hill rocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles flowing or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Humus: The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups: Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separated factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils have a very slow infiltration rate and thus a high runoff potential. they have a claypan or clay layer at or near the surface, having a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artifically drained and part is undrained.

Impervious soil: A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration: The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity: The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate: The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Lacustrine deposit (geology): Sediment deposited in lake water.

Landslide: The rapid downhill movement of a mass of soil and loose rock generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material very greatly.

Large stones: Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching: The removal of soluble material from soil or other material by percolating water.

Light textured soil: Sand and loamy sand.

Lithic contact: The contact between soil and coherent, continuous underlying material (hard rock), which is hard enough to prohibit digging with hand tools and if fractured the pieces are not displaced relative to each other.

Liquid limit: The moisture content at which the soil passes from a plastic to a liquid state.

Loam: Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength: Inadequate strength for supporting loads.

Medium textured soil: Very fine sandy loam, loam, silt loam, or silt.

Mesic: A soil temperature regime in which the mean annual soil temperature is 47°F (8°C) or higher but lower than 59°F (15°C), and the difference between mean winter and mean summer soil temperature is more than 9°F (5°C) at a depth of 20 inches (50cm) or at a lithic or paralithic contact, whichever is shallower.

Metamorphic rock: Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are chrystalline.

Mineral soil: Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Miscellaneous areas: Areas that have little or no natural soil.

Moderately coarse textured (moderately light textured) soil: Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil: Clay loam, sandy clay loam, and silty clay loam.

Mollic epipedon: A thick, dark surface layer, more than 50 percent based saturated, with a strong soil structure and having a soft consistence when dry.

Morphology, soil: The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil: Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage.

Descriptive terms are as follows: abundance - few, common, and many; size - fine, medium, and coarse; and contrast - faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium for 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Munsell notation: A designation of color by degrees of the three single variables - hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil: A soil having a pH value between 6.6 and 7.3.

Nutrient, plant: Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Ochric epipedon: A light-colored surface horizon generally low in organic matter which includes eluvial layers near the surface and is often hard and massive when dry.

Pan: A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, hardpan, fragipan, claypan, plowpan, and traffic pan.

Paralithic contact: The contact between soil and coherent, continuous underlying material (soft rock), which is soft enough to permit digging with hand tools and, if fractured, the pieces are not displaced relative to each other.

Parent material: The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped: An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon: The smallest volume that can be called "a soil". A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation: The downward movement of water through the soil.

Percs slowly: The slow movement of water through the soil adversely affecting the specified use.

Permeability: The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.20 inch), moderately slow (0.2 to 0.6 inch), moderate (0.6 to 2.0 inch), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

Phase, soil: A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value: (see Reaction, soil) - A numerical designation of acidity and alkalinity in soil.

Piping: Moving water from subsurface tunnels or pipelike cavities in the soil.

Plasticity index: The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit: The moisture content at which a soil changes from a semi-solid to a plastic state.

Polypedon: A volume of soil having properties within the limits of a soil series, the lowest and most homogeneous category of soil taxonomy. A "soil individual".

Poorly graded: Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity (soil): The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil: A vertical section of the soil extending through all its horizons and into the parent material.

Range (or rangeland): Land that, for the most part, produces native plants suitable for grazing by livestock; includes land supporting some forest trees.

Range condition: The health or productivity of forage plants on a given range, in terms of the potential productivity under normal climate the best practical management. Condition classes generally recognized are excellent, good, fair, and poor. The classification is based on the percentage of original, or assumed climax vegetation on a site, as compared to what has been observed to grow on it when well managed.

Range site: An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind and amount of native vegetation.

Reaction, soil: The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as--

	pH		pH
Extremely acid. . .	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid . . .	5.1 to 5.5	Moderately alkaline . .	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline . . .	8.5 to 9.0
Slightly acid . . .	6.1 to 6.5	Very strongly alkaline .	9.1 +

Regolith: The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only that part of the regolith exposed to or involved with soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil".

Relief: The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material): Unconsolidated, weathered or partly weathered mineral material that accumulated over disintegrating rock.

Rill: A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments: Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth, shallow (shallow root zone): The soil is shallow over a layer that greatly restricts roots. See Root Zone.

Root zone: The part of the soil that can be penetrated by plant roots.

Root zone, effective: The part of the rooting zone where plant roots derive the major part of the moisture and nutrients.

Runoff: The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline-alkali soil: A soil that contains a harmful concentration of salts and exchangeable sodium; contains harmful salts and is strongly alkaline; or, contains harmful salts and exchangeable sodium and is very strongly alkaline. The salts, exchangeable sodium, and alkaline reaction are in the soil in such location that growth of most crop plants is less than normal.

Saline soil: A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess excangeable sodium.

Sand: As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone: Sedimentary rock containing dominantly sand-size particles.

Saprolite (geology): Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical wethering of igneous and metamorphic rock. In soil survey, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock: Rock made up of particles deposited by water, wind, or ice. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage: The rapid movement of water through the soil. Seepage adversely affects the specified use.

Sequum: A sequence consisting of a illuvial horizon and the overlying eluvial horizon.

Series, soil: A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale: Sedimentary rock formed by the hardening of a clayey deposit.

Shallow: Soils that are less than 20 inches in depth to a duripan, petrocalcic horizon, or paralithic contact.

Sheet erosion: The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell: The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica: A combination of silicon and oxygen. One mineral form is called quartz.

Silt: As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone: Sedimentary rock made up of dominantly silt-sized particles.

Skeletal: Describes particle-size classes in which rock fragments 2mm in diameter or larger make up 35 percent or more by volume.

Slope: The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Small stone: Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Sodicity: The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na+ to Ca++ + Mg++. The degrees of sodicity are --

	SAR
Slight.	Less than 13:1
Moderate	13-30:1
Strong	More than 30:1

Soil: A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates: Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: very coarse sand (2.0 millimeter or 1.0 millimeter); coarse sand (1.0 to 0.5 millimeter); medium sand (0.5 to 0.25 millimeter); fine sand (0.25 to 0.10 millimeter); very fine sand (0.10 to 0.05 millimeter); silt (0.05 to 0.002 millimeter); and clay (less than 0.002 millimeter).

Solum: The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones: Rock fragments 10 to 25 inches (25 to 60 centimeters) in diameter.

Stony: Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified: Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil: The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are - platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil: Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum: The part of the soil below the solum.

Subsurface layer: Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil: The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). frequently designated as the "plow layer", or the "Ap horizon".

Taxadjuncts: Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use or management.

Terrace (geologic): An old alluvial plain, ordinarily flat or undulating, bordering river, a lake, or the sea. A stream terrace if frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited or eroded by the sea.

Texture, soil: The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse", "fine", or "very fine".

Thermic: A soil temperature regime in which the mean annual soil temperature is 59°F (15°C) or higher but lower than 72°F (22°C) and the difference between winter and mean summer soil temperature is more than 9°F (5°C) at a depth of 20 inches (50 cm) or at a lithic or paralithic contact, whichever is shallower.

Thin layer: Otherwise suitable soil material too thin for the specified use.

Toe slope: The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering): Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Trace elements: The chemical elements in soils, in only extremely small amounts, essential to plant growth. Examples are zinc, cobalt, manganese, copper, and iron.

Upland (geology): Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil: A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table: The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent: A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian: A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

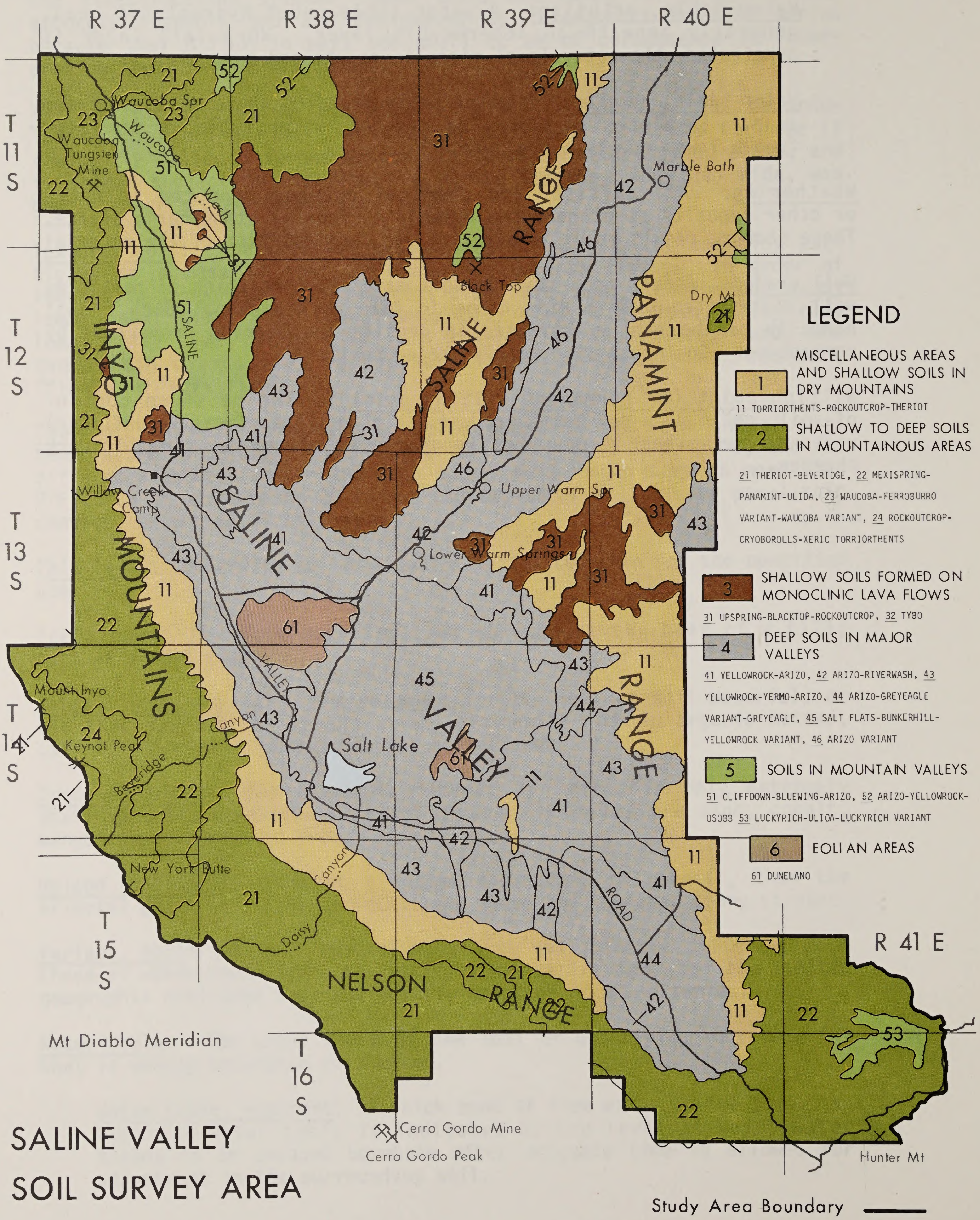
Water table, perched: A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering: All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded: Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point): The moisture content of soil, on an oven-dry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

GENERAL SOIL MAP



INDEX TO MAP UNITS

Map Symbol	Map Unit Name	Acres
101	Arizo complex, 5 to 15 percent slopes.	31,595
102	Arizo Variant very stony loam, 2 to 9 percent slopes.	2,350
103	Badland.	3,810
104	Beveridge very gravelly sandy loam, 30 to 75 percent slopes.	12,970
105	Blacktop -- Rock outcrop complex, 30 to 75 percent slopes.	2,560
106	Bunkerhill loamy fine sand, 0 to 2 percent slopes.	12,685
107	Cinder land.	385
108	Cliffdown - Yermo - Arizo association, channeled, 5 to 15 percent slopes.	13,530
109	Cliffdown Variant very cobbly loam, 30 to 50 percent slopes.	200
110	Dune land	1,200
111	Dune land - Bunkerhill association, hummocky, 0 to 9 percent slopes.	1,995
112	Ferroburro - Rock outcrop complex, 50 to 75 percent slopes.	6,490
113	Ferroburro Variant stony sandy loam, 30 to 75 percent slopes.	600
114	Greyeagle - Arizo association, channeled, 5 to 9 percent slopes.	6,580
115	Greyeagle Variant - Arizo association, 5 to 15 percent slopes.	1,950
116	Huntmount - Ferroburro - Rock outcrop association, 30 to 75 percent slopes.	4,500
117	Luckyrich - Ulida - Luckyrich Variant association, 0 to 15 percent slopes.	2,500
118	Mexispring - Luckyrich - Panamint association, 15 to 50 percent slopes.	12,550

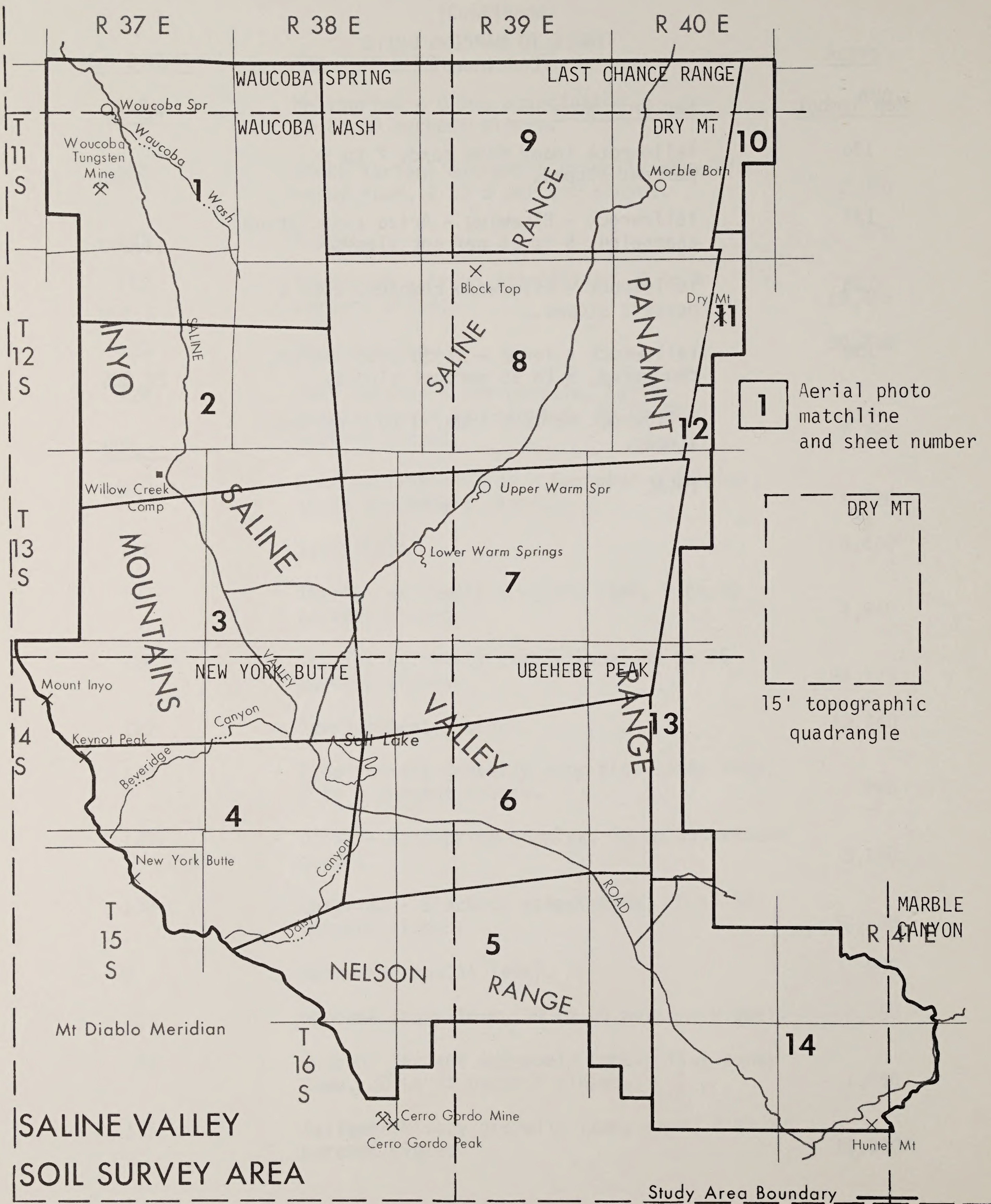
INDEX TO MAPPING UNITS
(Continued)

Map Symbol	Map Unit Name	Acres
119	Mexispring - Ulida association, 30 to 50 percent slopes.	800
120	Osobb Variant extremely gravelly very fine sandy loam, 2 to 5 percent slopes.	2,030
121	Playas.	520
122	Riverwash - Arizo association, 0 to 5 percent slopes.	10,475
123	Rock outcrop.	30,230
124	Rock outcrop - Cryoborolls, Xeric-Torriorthents association, 30 to 75 percent slopes.	7,390
125	Rock outcrop - Ulida - Ferroburro complex, 15 to 75 percent slops.	9,620
126	Salt Flats.	3,660
127	Theriot extremely gravelly loam, 5 to 30 percent slopes.	4,960
128	Theriot extremely cobbly loam, 30 to 75 percent slopes.	84,175
129	Torriorthents, stony.	13,340
130	Tybo Variant gravelly very fine sandy loam, 2 to 5 percent slopes.	260
131	Ulida - Mexispring complex, 50 to 85 percent slopes.	3,100
132	Upspring - Blacktop association, 15 to 50 percent slopes.	63,790
W	Water (perennial lake).	200
133	Waucoba stony loam, 30 to 85 percent slopes.	2,560
134	Waucoba Variant extremely cobbly fine sandy loam, 30 to 75 percent slopes.	1,050
135	Yellowrock very gravelly loamy sand, 2 to 5 percent slopes.	16,940

INDEX TO MAPPING UNITS
(Continued)

Map Symbol	Map Unit Name	Acres
136	Yellowrock loamy fine sand, 2 to 9 percent slopes.	990
137	Yellowrock - Bluewing - Arizo association, channeled, 5 to 15 percent slopes.	11,200
138	Yellowrock - Riverwash complex, 2 to 5 percent slopes.	2,100
139	Yellowrock - Yermo - Arizo association, channeled, 5 to 15 percent slopes.	28,565
140	Yellowrock Variant loam, 0 to 2 percent slopes.	1,600
	TOTAL	418,000

SOIL MAP INDEX



CONVENTIONAL AND SPECIAL MAP SYMBOLS

CULTURAL FEATURES

Boundaries

Reservation boundary

Limit of Soil Survey

Field sheet matchline

Land division corners

Roads

County

Trail

Mine or quarry

WATER FEATURES

Drainage

perennial streams

Intermittant streams

Drainage end

Lakes, ponds, Reservoirs

Perennial

W

Miscellaneous water features

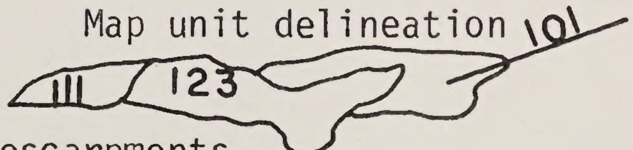
Marsh or swamp

Spring

Well, artesian

SPECIAL SYMBOLS FOR SOIL SURVEY

Map unit delineation



escarpments

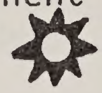
Bedrock (points down slope)

Short steep slope

Representative Pedon

MISCELLANEOUS

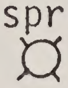
Prominent hill or Peak



Rock outcrop

✓

Hot spring Tufa deposits (5 acres per symbol



Slips and landslides